The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXXVI. January 16, 1937 No. 916

Spelter Manufacture

THE manufacture of zinc after its early days in England seems to have been largely developed in Belgium, and the horizontal retorts that were formerly the only method used for the production of zinc from its ores, and which are still largely employed for this purpose, have taken their name from that country and are known as Belgian retorts. It would be difficult to imagine Belgium without a zinc industry in which huge quantities of sulphuric acid are the chief by-product. The situation, however, is somewhat different in this country and it is safe to say that there would have been no British zinc industry after the war if it had not been for the energy and enthusiasm of the National Smelting Co. It was, therefore, with particular interest that members of the London section of the Society of Chemical Industry heard a lecture by Mr. Stanley Robson, managing director of the company, upon "The Manufacture of Zinc."

The electrolytic method for the production of zinc is not possible as a manufacturing process in this country because it depends so greatly upon availability of a cheap source of power. It is, therefore, necessary to use the distillation method. The ore is first roasted to convert it into oxide, which is then reduced by heating to some 1,100° C. intimately mixed with carbon. Two of the principal impurities, cadmium and lead, boil below the boiling point of zinc, and generally distil over first, whilst the zinc, which boils at 907° C. is liberated from the retort in the vapour phase, leaving some of the residue behind in the retort. For many years the method used has been the Belgian or similar process involving the use of small horizontal retorts, several of which are placed in a setting reminiscent of the horizontal gas retort. The smelting process as originally in vogue suffered from several defects, these being primarily a high loss of zinc, which exceeded (sometimes greatly exceeded) 10 per cent., a high cost of treatment caused by the expense and short life of the retort, and a low thermal efficiency, of the order of 2 to 5 per cent.

These defects have had to be overcome. The low thermal efficiency has been improved in the first place by the use of gas heated regenerative furnaces. Hand firing required the use of three to four tons of coal per ton of ore; with gas firing this was reduced to an equivalent coal consumption of 1.5 to 1.75 tons, and with the addition of regenerators the coal consumption was reduced to 0.9 ton. The yield of zinc in 1844 was 62 per cent.; in 1880 it had risen to 75 per cent., and in 1922 there had been a further improvement to 87 to 90 per cent. No details were given as to the present loss at Mr. Robson's works, but it is believed to be less than 10 per cent. with the horizontal retorts.

Work on the horizontal retorts was formerly very arduous, with the result that twenty years ago the furnace men employed in British works were a rough, ignorant, uncount set of men of heterogeneous nationalities. Amid the fascinating technical description of the process given by Mr. Robson it was possible to detect the great technical advances that have been made in the process and perhaps no evidence of advance is more striking than that revealed by the personnel of the furnace men. To-day these are British workmen of a very high class who, before going home, bath and change so that they cannot be distinguished from office workers. The improvement in the conditions which has rendered this change possible has been largely due to the efforts of the late Mr. A. H. Ivey, whose untimely death, on November 26 last, is so much deplored in the chemical and metallurgical industries. There could not have been this improvement in personnel and in the conditions of the workmen unless the technical efficiency of the process had been similarly improved.

A new and striking improvement in the technique of zinc distillation is the application of the continuous vertical retort, accompanied by the employment of fewer workmen. The output per retort has been multiplied many times, the size of the condensers has been increased from the small man-handled fire-clay vessels of the horizontal retort to large chambers permanently fixed. The carbon monoxide which was allowed to burn to waste at the mouth of the horizontal retort is now collected from an off-take at the top of the retort, purified, and used for heating the retort, with a considerable further reduction in fuel consumption.

The value of the vertical retort is equally evident in the purity of the zinc produced. The greater uniformity in the operation of vertical retorts improves the quality of the product. The purity of the zinc from horizontal retorts varied with the skill of the operator, and it is difficult to give precise figures. Redistillation, however, produced a zinc containing more than 99.99 per cent. Zn. The product from electro-metallurgical processes was considerably purer than anything obtained from a horizontal retort, but the redistilled product from the vertical retorts, if we understood Mr. Robson's remarks aright, is in a class by itself. The purity of the zinc governs its resistance to corrosion and to attack by acids, and it is a notable achievement on the part of the National Smelting Co. to produce regularly zinc containing not less than 99.997 per cent. Zn.

It would have been interesting to have heard more about the vertical retort process. We should have liked, for example, to know something of the refractories that have been used to solve the necessary requirement of long life of a structure relatively so expensive when compared with the Belgian system. Hofmann's treatise on the zinc industry records that "the art of zinc

smelting was brought a few years previous to 1740 by Dr. Isaac Lawton from China to England when the first smelting works was erected by Champion near Bristol, in 1743. The process was kept secret until towards the end of the century, when Johann Richberg visited England, learned the art, returned to Upper Silesia in 1798 or 1799 and started operations at the glass works at Wessole, near Myslowitz." It is not difficult for industrial secrets to be discovered, and Richberg's initiative caused the zinc industry to spread all over Europe. By 1913 Germany produced 267,000 tons, Belgium 194,000 tons, the United Kingdom only 58,000 tons, while the United States dwarfed every other nation with a production of 308,000 tons.

Notes and Comments

Tell Your Banker

MOST people will have discovered by now what it is that they have to tell their bankers in obedience to the nation-wide mysterious exhortation. It is simply this: "Transfer to the King George V Memorial Fund the odd shillings and pence in my account on the night of January 20" (the anniversary of the death of the King). No apology is needed for commending so deserving a scheme to the chemical industry. The proceeds will be devoted entirely to providing playing fields in towns and villages throughout the land. The fact that the thoughts of those of us who live in large towns turn immediately to children in slum conditions and crowded streets when we think of the need for playing fields must not obscure the conditions in the countryside. It is a fact that not one village in ten in Great Britain owns its own playing field, and in the light of present building developments this position cannot but lead to great difficulties and hardships for future generations. Unless countryside fields are preserved now as open spaces it may be an impossibility to provide in the countryside better playgrounds than now exist in our towns. The fields provided under the scheme will be marked by means of entrance gateways that will for all time proclaim them "King George's Fields."

Offering Jobs by Tender

WHATEVER justification there may be for industrial employers to invite applicants for employment to "state salary required" cannot in any circumstances apply in the case of public appointments, and yet, apparently, the habit still persists in certain directions. The Journal of the Institute of Chemistry records that at a recent council meeting a letter was received from a Fellow directing attention to the action of a county council which appeared to indicate that it was seeking to decide a public appointment "by tender," a method of which the Ministry of Health had long since expressed strong disapproval. The Institute has on more than one occasion pointed out that the public interest is not likely to be served by the selection of a candidate who places the least value on his services. We would go further and use the same argument in regard to the engagement of qualified chemists in industry. If prospective employers would announce frankly either the exact salary, or the range of salary, they offer, they would obviate the receipt of many unsuitable applications, and they would certainly be more likely to get the right type of candidate. In the twelve months ended September 30, 1936, the Institute was only able to ascertain the salaries secured by 339 out of 963 successful applicants for positions. Of the total of 339, 166 received from £250 to £500 per annum; 35 received less than £200; 75 received from £200 to £250; 50 from £500 to £1,000; and thirteen received over £1,000.

Fewer Unemployed Chemists

DESPITE an increase of over 200 in total membership, the Institute of Chemistry reports a decrease in the number of members unemployed during the twelve months ended September 30, 1936. In October, 1935, there were 128 fellows and associates without remunerative employment, against 147 the year before; in January, 1936, there were 120 (against 125); in April 112 (against 113) and in July 109 (against 122). The minimum (101) was reached on June 15. Of the 116 who remained disengaged at the end of September, 31 had been unemployed for three months or less, 30 for three to twelve months, and 55 for over a year, the last number comparing with 61 a year earlier. During the year 963 vacancies were notified to the Institute against 1,044 in 1935 and 896 in 1934. Industrial appointments offered during the twelve months totalled 509, and other openings were roughly as follows: Government appointments, 67; universities, 58; schools, 59; educational authorities, 17; public bodies, 44; chemical engineers, 24; salesmen, 8; junior appointments, 49; temporary appointments, 16; scholarships, 32; appointments for women, 80. No information is given as to the percentages of members disengaged in the various age groups, but in actual numbers unemployment was worst among those from 21 to 25 years of age (a total of 30), the figures for the other groups being as follows: 25—30 years, 15; 30—35 years, 18; 35—40 years, 16; 40—45 years, 14; 45—50 years, 9; 50 and over, 14.

Chemical Science and Ethics

IN these days of so much talk of chemical warfare it is well that Sir Richard Gregory should defend science against its critics, whose comprehensive indictment he summed up the other day in Ruskin's phrase that science labours "to kill and put down noble life." When science gave man the capacity of flight he was not required to use it to bomb and burn and poison. In showing men how to develop new processes of production science did not make the bad conditions of industrial areas a necessary consequence. Mankind might conceivably have been spared the horrors of poison gas and slums, but he might have been left a savage. On balance, as Sir Richard has pointed out, life has been made immeasurably easier and richer. Sir Richard says quite justly that whether any discoveries are used for good or for evil depends upon the results of ethical and spiritual teaching.

The Application of Chemistry to Industry

Mr. H. W. Cremer's Lecture at Liverpool

PURE Science, its Interpretation, Co-ordination and Application, was the subject of an address by Mr. H. W. Cremer, F.I.C., of King's College, London, before the Liverpool Section of the Society of Chemical Industry on January 8.

Mr. Cremer referred to a few of the difficulties encountered in applying science, notably chemistry, to industry, with particular reference to the somewhat divergent view-points of the scientist and the industrialist. In this connection, he advocated that the criticism of each by the other could well be more constructive and helpful than is frequently the case. In the abstract, he said, science and industry were bosom companions, and it was only among their disciples that one saw a tendency to disputatiousness and the throwing of stones.

Mr. H. W. Cremer, F.I.C., King's College, London.

Referring to the early training and outlook of the chemist, the lecturer made suggestions as to how both undergraduate and post-graduate students could be given a fuller appreciation of the bearing which even the more recondite portions of their studies had on modern industry. He stressed the importance of awakening in the student's mind at an early stage the need for correlating the various branches of pure science. Dealing with research work, he suggested that in the post-graduate studies, students should limit their activities to that field on the borderland between chemistry and the other sciences. It was during the years of post-graduate work that one should look for a real awakening of the responsibilities to himself and to his tutors. During that time he was expected to look after himself and must exercise his personality. The full value of the scientist's existence could only be felt by realising the difficulties which existed in the industrial manufacturing side.

The Value of Experimental Data

Mr. Cremer referred to research and the necessity for both pure and applied chemists to be fully alive to their responsibilities in making available data which could be accepted as reliable. There was a tendency at times, he said, for things to appear in print after a lack of research or confirmation and he regretted that this tendency was more apparent in applied chemistry. Referring to the question of preliminary data for research work, he remarked that it would be fatal to the interests of pure and applied research if the research worker was to feel that he had to put a great deal of work in on what might be called superficial work. In regard to the publication of research work in the scientific and technical Press, one could wish that the laudable efforts to reduce space did not result in the too drastic curtailment of the experimental data on which conclusions were based, or in other cases the almost complete elimination of such data. One of the most serious objections to this was that encouragement was given to that type of mind which hastened to draw conclusions from insufficient data. The data on which results were obtained was frequently of importance to others who wished to use them in their own work.

The author proceeded to deal with the closer linking of science and industry, which can result in cases where the more theoretical lines of approach to industrial research problems are assigned to the universities, and in which the pure scientist is collaborating with directors of industrial research organisations who understand his way of thinking and at the same time is brought to a fuller realisation of the significance of his work in practical affairs. He also touched upon the relationship between the industrialist and his own scientific staff in respect of long range research.

One of the chief points to which the author drew attention in discussing the interpretation of science was the preparation of reports intended for perusal by semi-technical or non-technical authorities. He referred to the lack of discernment sometimes shown which caused such reports to be needlessly obscure, lacking in emphasis of the main points, and tending to include terms which, although of every-day use in the laboratory, possessed quite separate and distinct meanings to the lay mind. Properly used, scientific jargon enabled workers to converse with the minimum of words; it saved print, and made it possible to define completely, without risk of misunderstanding, a particular compound or set of conditions.

Dealing with the question of co-ordination and application, the lecturer remarked that the technical man may get a little impatient with the pure chemist in not committing himself to his views. The industrialist had what he wanted clearly before him, whilst the chemist would want to proceed through the whole theory. It was well to remember that the pure chemist would readily admit that practice was a very long way ahead of theory. Referring to the awakening of the pure chemist to industrial needs, Mr. Cremer said there was a type of lecture which was a kind of refresher course and there was also the type which dealt with pure chemistry. In his opinion, papers which combined the practical with the pure chemistry were ideal.

The lecturer continued with a general indication of the way in which the scientific approach to certain processes and operations of common use in the chemical industry, even if they did not always afford an absolute basis for plant design, did at any rate serve to establish the various factors involved, a clear appreciation of which was necessary if this design was to have a rational basis. In choosing his examples, the author kept in mind one of the main points of his subject, *viz.*, the need for co-ordinating the various branches of science which underlay chemical processes carried out on an industrial scale. Chemical engineers would recognise in those examples, he remarked, a number of the "unit operations" with which they were familiar. The chemical engineer must, in fact, not only see things superficially but as a whole.

Judging Practical Values

One of the chief criticisms of the industrial research chemist, for which there was some justification, was that he was not "dividend-minded," and pursued his investigations beyond the point at which they had a practical value; but the chemist retorted that the business man was hardly the best judge.

The chemist maintained that he should not be expected to produce gold bricks at stated intervals, especially seeing that many profitable side-lines, and even major undertakings, had arisen from fortuitous discoveries. It was to be wished that criticism of each by the other might be constructive rather than destructive.

The CHAIRMAN, in thanking the lecturer, said he was impressed by the plea that criticism should be constructive rather than destructive. He himself was an old works chemist and he appreciated what Mr. Cremer had said about the attitude in academic circles towards industrial research work. There were many who did not realise the valuable research

work which was going on in many of our industrial laboratories. He was not greatly impressed by criticism of examinations from extraneous sources.

Mr. E. T. WILLIAMS, dealing with the large amount of work carried out by students at the University, said he wondered whether a solution was not to be found in a better selection of students. Students learnt a great deal more of practical value when they entered industry than during their university career. He did not agree with some of the material which was published during the year. There was a great deal of journalistic "tripe" written in regard to what was happening. Referring to the question of technical reports, he remarked that if one was to have a lucid report, one must have a reporter who was capable of expressing himself properly.

Another member pointed out that the structure of industry at the moment was such that there was a greater demand for the physicist than the chemist as he was ordinarily turned out by the university. But, as Mr. Cremer pointed out, combining all these qualities there was nobody who could meet these demands like the chemical engineer. The training of a chemical engineer was such that he should be able to apply it to any form of industry. He thought the universities should train the students for entry into industry, rather than give them general principles. In entering industry they had to remember that by its structure the industry provided not only work of a most practical kind, but that the graduate going from the university to industry had not only to apply the knowledge he had acquired in the university, but that he must continue as a student in the new environment. Too often the student thought that he had finished his educational career and took no further notice. Mr. Cremer had mentioned the importance of giving the student a knowledge of how his education might be applied to industry in the future. He himself looked at this matter in another way and that was that the student going into industry should have a due regard for his humbleness in the industry.

A Student's Views

A student, entering the discussion, said that every time they attended these lectures, they were told what they should and what they should not learn and as they all knew, they, as students, were crammed full of stuff which might or might not be useful. From what had been said that night it might be thought that the chemistry students did nothing, but in fact they had to work hard to get through what was expected of them.

Professor C. O. BANNISTER, proposing the vote of thanks, said that they in the teaching profession did not agree that examinations were not necessary, but it was not necessarily the man at the top who was best suited to work in the industry concerned, because quite frequently the man was was lower down did better than the other.

Mr. A. E. FINDLEY, seconding, suggested that the teaching of the scientist should be left to the universities and that the three R's should be taught in the schools. Remarking that the teachers received the fullest information on recent advances in science in the teaching journals, he said this encouraged them to impart a greater standard of scientific knowledge than was warranted. In consequence, the boy came to the university with a great knowledge, say, of alpha-rays before he knew how to count properly.

An Appeal to I.C.I. to Open a Lunatic Asylum

By PROFESSOR H. E. ARMSTRONG

AT the moment an appeal is made for funds to assist publication by the Chemical Society. I would urge that not a halfpenny should be given except to aid work that is described without slang in the English language, with some understanding by the writer of words derived from the Greek.

Imperial Chemical Industries and the Department of Scientific and Industrial Research are primary offenders in giving grants to persons who eventually account for the aid in terms beyond any ordinary comprehension. The Journal of the Chemical Society is thereby made unreadable by all but a few experts—the Society is publishing itself out of existence.

What is most serious is the effect upon students—instead of growing up rational beings, they are saturated with a jargon and laboratory slang which affects their whole outlook and greatly lowers their value in industry.

We have let into chemistry a class of person who are not chemists and never will be—they are incompetent as workers and critics of work. These are reduced to advancing speculations, which may or may not have an element of truth in them but at present are premature and in no way helpful. These resonant individuals are claiming an altogether undue meed of attention.

There seem to be centres of infection. One is in the neighbourhood of Madame Tussaud's, a museum of effigies of criminals. More intolerable nonsense—to the chemist—could not be talked than is to be heard in this quarter. The public complains of Soviet conspirators in our midst—chemists have cause to complain still more of the conspirators active in the Soho region in undermining our fair science.

Another centre, at Huddersfield, blossoms out in the current issue of the Journal. It appears to be the practice there to coach evening class students in preparation work, aided by the D.S.I.R. and I.C.I. Really what is done is mere *Beilsteining*, involving nothing more than making a new preparation—good work in its way.

Merely to describe what is done would make no show. The worker could not go out with a claim to have done "Research." So the teacher adds his name and a pretentious "theoretical section" is drawn up to delude the unwary. Described in ordinary Beilstein terms, half a page would suffice. Formulæ are used of absurd complexity, with bent arrows everywhere—clearly cases of—

> I shot an arrow into the air
> It fell to earth I know not where!

All the theoretical flummery comes in at the end in "langwidge" that is hopeless: the simple old term *condensation*, for example, is changed to *chetation*, an absurdity my friend Sir Gilbert Morgan is guilty of introducing.

Unfortunately, example spreads. The work done under the ægis of I.C.I. on *Phthalocyanines*, technically superb, which deserved to be described with the utmost care in the English language, is disfigured here and there most unnecessarily by use of current laboratory slang.

If the disease spread any further, it will be necessary that some of us who hold I.C.I. shares raise a protest against our money being spent in publishing work in such a tortuous way—in a way that can only diminish the efficiency of the men the firm might employ.

I would go further and suggest that I.C.I found a lunatic asylum for sufferers from the diseases to which I have called attention. Perhaps the first thing to do would be to examine the academic Professoriate and select those for cure who are most obviously affected. Probably the example thus set would have the effect of making the others wary.

Our need can be expressed in a single sentence: it is, that we be honest once more. The Primate complains of social morals, which are but reflections of human nature and easily contravened. Our fraternity is set up as a class apart, as seeking after knowledge and truth; to fail in this mission would be disastrous.

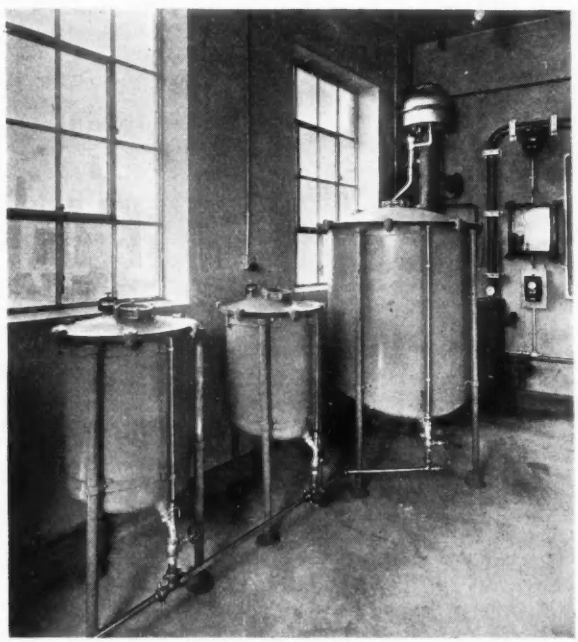
Factory Equipment for the Manufacture of Cosmetics

By A. G. WRIGHT

IN the manufacture of cosmetics there is a limited number of materials which can be used as constructional materials for factory equipment. Cosmetics, like foodstuffs, require a high degree of cleanliness both in manufacture and in storage, but general cleanliness alone does not suffice. It is also necessary to provide for the easy and effective cleansing of mixing and storage vessels, when changing from one product to another in the commonly adopted routine of batch manufacture. Cosmetic preparations invariably incorporate perfumery materials, and the choice of perfume is dictated by the individual tastes of the purchasing public. In consequence, the manufacturer is called upon to offer his products in a variety of perfumes, and, in the case of tooth paste and mouthwash, even with variations in taste. Several differently perfumed batches of a particular product may therefore be handled in the course of the week's work, and with the use of a limited range of equipment the change over from one batch to another must be done without the risk of "passing on" the perfume used for a preceding batch. The same applies to a change in the basic materials incorporated into the product, especially those of a fatty or oily nature.

Selection of Suitable Vessels

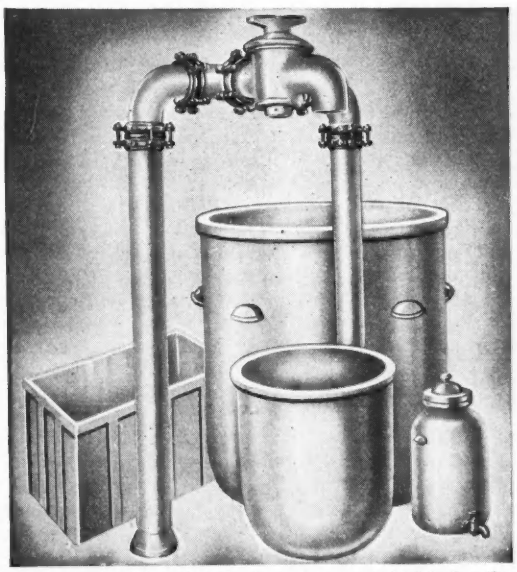
In large-scale manufacturing it is possible to retain one particular mixing vessel for each manufacturing operation, and to install a very large number of separate storage vessels for the finished products. In the case of the small manufacturer, however, economic reasons make it very necessary to



Pfaudler glass lined tanks for storing essential oils and distilled water. The use of glass lined steel ensures laboratory control over each stage of production. (Enamelled Metal Products Corporation (1933), Ltd.)

limit the initial outlay on equipment, and it becomes necessary to select vessels which are suitable for working up intermittent batches of material with the possibility of a sudden change in manufacturing procedure or product.

Of all materials which are available for the construction of vessels, glass is most easily cleaned provided that proper means are adopted for dealing with oily or greasy residues. In consequence glass equipment is the least liable to "pass on" a perfume from one batch to another. Its somewhat fragile nature, however, prevents it from serving to any great extent in factory operations, apart from the fact that glass vessels increase considerably in cost as the capacity increases. It was mainly due to this need for utilising the desirable qualities of glass, that the so-called "glass-lined steel" was first introduced as a material of construction and ultimately became widely adopted in the perfumery and cosmetic manufacturing industry. The surface of glass-lined steel is just as smooth as the surface of good quality domestic glassware. There are no crevices, cracks or pores where perfumes, or fatty or oily materials, can be retained to the detriment of a



A group of white chemical stoneware suitable for the soap, perfumery and cosmetics industries, comprising tank, storage vessels, pipe line and taps. (Doulton and Co., Ltd.)

succeeding batch of material. Even after a long period of storage it is quite easy to remove every trace of perfume from such a storage vessel, and as the glass lining is both alkali and acid resistant the removal of fats and oils is equally easy and unattended by risk of injuring the interior of the vessel.

Glass-lined steel, moreover, may be heated if necessary just the same as if it were ordinary steel. In other words, a vessel which is made of glass-lined steel combines the cleanliness of a glass vessel with the serviceable nature and mechanical strength of a steel vessel.

Enamelled Steels

This glass-lined steel must not be confused with some of the so-called enamelled steels. Although there is similarity in the means adopted for applying the internal coat of glass or enamel, the chemical composition of the two materials may be widely different, and one particular ingredient of the enamel may improve its properties in one direction and yet make the enamel lining unsuitable for use in some other direction. It is for this reason that the manufacturer of "enamelled" iron and steel vessels should always be told the precise use for which any vessel is intended, and of temperature conditions and the true nature of the liquids which are to come in contact with the "enamelled" surface. If this is not done the manufacturer of the vessel is not in a position to offer a suitable enamel and guarantee satisfactory service for the vessel which is supplied. This close co-operation between user and manufacturer of factory equipment is still a matter which calls for a more sensible outlook, for the

user of the equipment is so often hesitant to disclose even mere outline details of his manufacturing procedure.

Glazed earthenware and "chemical stoneware" are alternatives to glass-lined steel and enamelled steel. They have a surface which is equally impervious but not always quite so smooth. The increased weight of these vessels is one of their chief disadvantages, to which must be added the need for precautions in applying heat and limiting the temperature.

Good makes, however, are no longer fragile, and they will often withstand a very heavy blow without cracking or breaking. Three types of surface finish are obtainable. Salt glaze is acquired in the kiln by the action of common salt which fuses the surface of the ware; slip glaze is applied by dipping the vessels in a mixture of easily fusible pottery materials and refiring them; there is also unglazed ware.

Characteristics of Chemical Stoneware

Chemical stoneware, either with or without glaze, should be non-porous and acid and alkali resisting; a glaze is applied to improve the appearance of the ware and to facilitate cleansing operations. Earthenware, on the other hand, largely depends upon its glaze for its liquor tightness, as the clays employed are not blended to the extent that they are in the case of true chemical stoneware. For cosmetic manufacturing white glazed ware, with a white clay body beneath the glaze, has a slight advantage over yellow or brown glazed ware in that it facilitates the observation of any slight change of colour whilst the product is in course of manufacture. Such white stoneware, however, is more expensive than a yellow or brown glaze.

Where it is necessary to apply heat to earthenware or stoneware vessels, the makers should be consulted about the maximum range and rate of application which is permissible. Heating is preferably done by means of a closed external bath, with water, salt brine or oil as the heat transmitting medium; sand baths are undesirable, except in the case of very small vessels. Heating should also be done gradually, and if live steam is used it must not be allowed to impinge upon the walls of the vessel.

The principal metals which are available as materials of construction are mild steel, stainless steel, copper, aluminium, nickel and monel metal. Copper is generally unsuitable for use in contact with materials of fatty or oily nature owing to discoloration troubles, but aluminium is perfectly satisfactory. Aluminium, moreover, has special features in being light in weight and low in price. It is very suitable for pans of all shapes, mixing tanks (complete with stirring gear and heating coils), and storage tanks (especially where products have to be kept in store for long periods without deterioration. The metal has a considerable degree of toughness, but when damaged it can be easily and cheaply repaired.

A wide variety of small manufacturing accessories are also obtainable, including filters, percolators, funnels, buckets, shallow trays, scoops, baling pans and pouring pots. Large pans which have to be carried are strongly reinforced with steel straps to which the handles are secured.

Stainless Steel Equipment

Stainless steel, with its polished surface, is practically immune from corrosion and will remain "bright" under all factory conditions and so give a general appearance of cleanliness. It is solidly stainless throughout the entire thickness of the sheet, and being stronger than ordinary mild steel it lengthens the life of equipment and almost eliminates repairs. It is completely resistant to the action of washing powders and cleansers, and offers very good service in contact with all the materials which enter into the manufacture of cosmetics. Its heat transmitting property, however, is rather low in comparison with ordinary mild steel and aluminium. Like aluminium, it is obtainable in the form of small manufacturing accessories.

Nickel is also in good demand where cosmetics manufacturing equipment is concerned. It has been usefully adopted for perfumery distillation equipment, for stirrers (on account of its high tensile strength and toughness), for mixing vessels (because the surface of the metal is exceptionally hard and resistant to scratching), and for special cases where strongly alkaline liquids are handled. Monel metal, which is approximately two-thirds nickel and one-third copper, is cheaper than pure nickel, and has been usefully employed in the construction of certain parts of tube filling and pot filling machines.

Letter to the Editor

References to Past Research

SIR,—There is an almost general complaint concerning the absence of suitable recognition, in many instances, of past work when papers are read on specific subjects in scientific research. Under existing circumstances the cause of this may generally be ascribed to the physical impossibility of an author searching through those journals out of the existing fifteen thousand published through the civilised world on scientific or technical subjects which might contain references to his own subject. On the other hand, the present unsatisfactory position cannot continue indefinitely without a grave risk of injustice to previous workers, a great loss of time when previous work is duplicated, and an inordinate loss of time when an attempt is made by an individual who attempts himself to make the necessary search through some leading scientific library, or possibly many.

It is now suggested that definite steps be taken to overcome the present position by definitely setting up a series of bibliographies in a properly classified manner. A writer of a paper might then be able generally to refer to the appropriate bibliography of past work, and anyone interested might be able, with a minimum of trouble, to consult the same at recognised centres or, if this is not convenient, receive the same personally. A basis of such a service already exists, for instance, in the recently set up Central Agricultural and Scientific Bibliography which operates from the Science Museum Library, South Kensington. Such a scheme must ultimately work on international lines, and to a classification like that adopted under the classification utilised already in some sixty scientific libraries in different countries. The standard classification already utilised might be used for this purpose with advantage to all, and a great saving in expense. All scientific libraries possessing the necessary scientific staff might reasonably co-operate in the proposed scheme. Also private workers who already possess, for their own purposes, partial or complete bibliographies on suitable subjects; the securing the advantage in time of having these kept up-to-date by the central institution or institutions indicated.

Obviously a long time would be required before any scheme of this nature could be operated on any scale, but the suggestion is made that a start should be made on possibly a national basis in the first instance. The writer will be pleased to hear from those who might like to have such a service at their disposal, if the necessary financial and other support can be secured.—Yours faithfully,

W. P. DREAPER.

27 Willow Road, London, N.W.3.

IT is reported that the Keikoku Senryo Kaisha (Imperial Dyestuff Co.), which has for some time been conducting research on the manufacture of Bordeaux, aided by Government subsidies, has just placed a sample product of this dye on the market under the trade name of "Teisen (Imperial Dye) Bordeaux 15.R." The company is expected to expand the output of the dye, which has hitherto been entirely imported, to the extent of manufacturing for export.

The British Industries Fair

Record Figures for Coronation Year

THE 1937 British Industries Fair, to be held in London and Birmingham from February 15 to 26, will be the biggest and most impressive yet organised. Already the record area occupied last year has been exceeded by more than 10,000 sq. ft. Coronation year, as the London overseas catalogue issued this week shows, will rank as one of outstanding achievements in the history of the Fair.

Eleven sections covered by the catalogue, including the chemical section, are larger than last year. The catalogue carries as an inset the advance list of exhibitors at Birmingham.

Of the 1,507 exhibitors detailed in the catalogue, London itself again sends the largest number—781. Birmingham (134) is second; Canada (65), with its composite commercial exhibit, and the Potteries (65) tie for third place; India and Manchester are next (47 each); and after them in order come High Wycombe (32); Sheffield (31); Nottingham (24); Lancashire (excluding Manchester and Liverpool) (20); Scottish towns, other than Edinburgh and Glasgow (20); Liverpool (19); Leeds (16); Glasgow (12); and Edinburgh (7).

Copies of the catalogue have been sent in nine languages to representatives of the Department of Overseas Trade in seventy countries, and will reach almost all of them before the Fair itself opens. Catalogues have also been despatched for wide distribution in hotels throughout the continent, and forwarded to those buyers who have already notified their intention to visit the Fair. Copies will also be displayed in the "Queen Mary," "Aquitania," and "Berengaria." More than sixty countries will be represented by the trade buyers who intend to visit the Fair. Holland heads the list and other countries well represented are Germany, Belgium, France, Denmark, United States, Sweden, and Poland. Spain, which last year sent a strong contingent, is a notable absentee; Italy is well represented.

The Irish Free State is again well ahead of all Empire countries sending buyers to the Fair. India this year takes second place from Canada, which is followed by South Africa and Australia.

The Chemical Section

The chemical section at Olympia is again being organised by the Association of British Chemical Manufacturers, and according to preliminary information the section will be larger than last year. Following is a complete list of exhibitors of chemical and allied products, with their stand numbers:—

OLYMPIA.

	Stand No.
A. U. Products, Ltd., Croydon	H. 1046
Abietsan Manufacturing Co., Ltd., London	H. 1016
Albright and Wilson, Ltd., London	A. 168
Association of British Chemical Manufacturers	A. 176
Avon India Rubber Co., Ltd., Melksham	H. 1072
Batley and Co., Stockport	H. 1059
Boake Roberts, A., and Co., Ltd., London	A. 169
Boots Pure Drug Co., Ltd., Nottingham	A. 218, A. 229
British Drug Houses, Ltd., London	A. 221, A. 225
British Fumigants Co., Ltd., London	A. 226
British Industrial Solvents, Ltd., London	A. 189, A. 198
British Titan Products Co., Ltd., Billingham-on-Tees	A. 257
Bush, W. J., and Co., Ltd., London	A. 171
Crystal & Co., Ltd., Rochdale	A. 227
Detel Products, Ltd., Greenford	A. 258
Distillers Co., Ltd., Edinburgh	A. 189, A. 198
Finlay, Alexander, Ltd., Belfast	H. 1050
Gas Light and Coke Co., London	A. 193
General Chemical and Pharmaceutical Co., Ltd., Sudbury	A. 191
H. G. Products, Ltd., Brentford	White City 1418
Hopkin and Williams, Ltd., London	A. 251
Howards and Sons, Ltd., Ilford	A. 222, A. 224
Hulse, F., and Co., Ltd., Woodlesford, Nr. Leeds	H. 1037, H. 1049
Imperial Chemical Industries, Ltd., London	A. 170, A. 174
Johnson and Sons, Manufacturing Chemists, Ltd., London	A. 178
Johnson, Matthey and Co., Ltd., London	D. 565
Kaputine (General) Syndicate, Ltd. (Parsons, Alex.), Manchester	H. 1054, H. 1065
Laporte, B., Ltd., Luton	A. 197
Lovell, H. S., and Co., London	H. 1009
Magnesite Syndicate, Ltd., Salem Junction, S. India	A. 223
Malehurst Barytes Co., Ltd., Shrewsbury	A. 197
Methylating Co., Ltd., London	A. 189, A. 198
Monsanto Chemicals, Ltd., London	A. 173
National Titanium Pigments, Ltd., Luton	A. 197
Newton Chambers and Co., Ltd., Sheffield	A. 220
Ozonol Laboratories (1930), Ltd., London	H. 1055
Phil-Sano, Ltd., London	H. 1052
Powell Duffryn Associated Collieries, Ltd., Cardiff	A. 175
Society of Chemical Industry, London	A. 256
South Metropolitan Gas Co., London	A. 195
Spencer Chapman and Messel, Ltd., London	A. 190
Thom, David, and Co., Ltd., Manchester	A. 247
Thorium, Ltd., London	A. 252
Trinidad and Tobago, B.W.I. (Official Exhibit)	Empire Section
Tyrer, Thomas, and Co., Ltd., London	A. 177
Whiffen and Sons, Ltd., London	A. 192
Williams (Hounslow), Ltd., Hounslow	A. 196

The Birmingham section, devoted to engineering and hardware, includes a number of exhibitors of chemical plant and equipment, although there is no official chemical plant section. Stands of interest to the chemical industry are as follows:—

BIRMINGHAM.

	Stand No.
Allen, Edgar, and Co., Ltd., Sheffield	D. 831, D. 730
Avery, W. and T., Ltd., Birmingham	D. 613, D. 512
Babcock and Wilcox, Ltd., London	D. 501, D. 400
Barronia Metals, Ltd., London	D. 605a
Birmingham Battery and Metal Co., Ltd., Birmingham	D. 707, D. 606
British Aluminium Co., Ltd., London	D. 911, D. 808
British Emulsifiers, Ltd., Teddington	A. 622
British Oxygen Co., Ltd., London	D. 511, D. 410
Bromford Tube Co., Ltd., Birmingham	D. 709, D. 608
Cellactite and British Uralite, Ltd., London	Ca 821, Ca 720
Chesterfield Tube Co., Ltd., Chesterfield	D. 709, D. 608
Controlled Heat and Air, Ltd., London	D. 327, D. 226
E. B. Refractory Cement Co., Ltd., Birmingham	Ca 904
Enfield Rolling Mills, Ltd., London	D. 419
Firth, Thos., and John Brown, Ltd., Sheffield	D. 408
Firth-Vickers Stainless Steels, Ltd., Sheffield	D. 513, D. 412
Fox, Saml., and Co., Ltd., Sheffield	D. 711
General Refractories, Ltd., Sheffield	D. 913, D. 810
Gibbons Bros., Ltd., Dudley	Ca 611
Imperial Chemical Industries, Ltd., London (Degreasing)	D. 405
I.C.I. Metals, Ltd., London	D. 503, D. 402
Johnson, Matthey and Co., Ltd., Sheffield	Cb 321
Meldrums, Ltd., Timperley	D. 212
Metalectric Furnaces, Ltd., Birmingham	D. 327, D. 226
Moseley, D., and Co., Ltd., Manchester	D. 719
Niagara Screens (Great Britain), Ltd., Enfield	D. 626
Exley Engineering Co., Ltd., Leeds	Ca 915
Siebe, Gorman and Co., Ltd., London	D. 839, D. 738
Simon, Henry, Ltd., Stockport	D. 611
Sizer, Richard, Ltd., Hull	D. 823, D. 722
Spencer-Bonecourt, Ltd., London	D. 501, D. 400
Spiral Tube and Components, Ltd., London	D. 910
Stewarts and Lloyds, Ltd., Birmingham	D. 601, D. 500
Thompson, John (Wolverhampton), Ltd., Wolverhampton	D. 909, D. 806
Unit Superheater and Pipe Co., Ltd., Birmingham	D. 206
Victaulic Co., Ltd., The, Birmingham	D. 601, D. 500
Walker, James, and Co., Ltd., Woking	D. 604

DAI NIPPON JINZO HIRYO (Japan Artificial Fertiliser Co., Ltd.) is said to be the only Japanese manufacturer of sodium silicofluoride. While the output was recently reported to approximate 70 metric tons monthly, whereof 50 tons were available for export, an early October Press statement placed production at 100 tons monthly, to be expanded before January 1, 1937, to 150 metric tons. Over 150 tons of Japanese sodium silicofluoride were imported into United States during the first nine months of 1936.

The Reversible Friedel and Crafts Reactions*

By LEE LINSLEY ALEXANDER

ALTHOUGH it has been recognised for many years that certain phases of the Friedel-Crafts reaction were reversible, the number of systematic studies of this phenomenon is small. The first investigation of note involved the work of Copisarow[1 2] on reversible alkylations of aromatic hydrocarbons under the influence of aluminium chloride. The present general problem of the reversibility of the Friedel-Crafts reaction had its conception in the study of the addition of benzene to *p*-chlorobenzalquinaldine.[3] It was found that benzene and aluminium chloride reacted with this compound to produce the halogen-free benzohydrylquinaldine. This effect was explained by a mechanism of reversible addition of benzene to the 1,4-system. Similar results and conclusions were obtained from investigations of the benzalacetone,[4] -acetophenone,[5] and -pinacolone[6] series, and from the halogen substituted cinmamic acids.[7] The present investigation was undertaken to study the extent and the applicability of this reaction to other systems.

Conjugated Ethylenes

It was interesting to determine the applicability of this reaction to compounds in which the addition of benzene should be inhibited by the presence of large groups. It was found that several unsaturated systems, bearing two aryl groups on the β-carbon atom, involved not only a replacement of substituted aryl groups but also an addition of hydrogen. The product in each case was identical to the compound obtained from a reversible addition of benzene to the corresponding unsaturated derivative bearing only one aryl group on the β-carbon atom. This type of conversion was shown to be general for several series of conjugated compounds.

Thus, *a*-benzohydrylacetophenone was obtained from 1,1-diphenyl-2-benzoylethene, 1,1-di-(*p*-chlorophenyl)-2-benzoylethene and 1-*p*-chlorophenyl-1-phenyl-2-benzoylethene by means of benzene and three moles of aluminium chloride. Under these same conditions 1,1-diphenyl-2-trimethylacetylethene underwent a reaction with benzene to produce benzohydrylpinacolone and a small quantity of diphenyl. Similarly, 1,1-diphenyl-2-(quinolyl-2)-ethene and β-(*p*-chlorophenyl)-cinnamic acid were converted into benzohydrylquinaldine and β,β-diphenylpropionic acid, respectively.

However, when only catalytic quantities (one and two-tenth mols) of aluminium chloride were used under conditions which were otherwise comparable, 1,1-di-(*p*-chlorophenyl)-2-benzoylethene, 1,1-diphenyl-2-benzoylethene, as well as 1,1 diphenyl-2-(quinoyl-2)-ethene were recovered unchanged.

To account for these results it was concluded that the addition of hydroygen was effected only by a large quantity of aluminium chloride, and that replacement of the substituted aryl group was entirely dependent upon the initial addition of hydrogen. The cleavage reaction and hence the reversible addition of benzene took place only after hydrogenation of the double bond had been accomplished. The order of the process was recognised to be as follows: additions of hydrogen, cleavage of the substituted aryl group and subsequent addition of benzene.

Aryl Ethylenes and Acetylene

Because of the similarity of the reactions effected in these several series of conjugated ethylenes, the question arose as to whether the reaction was characteristic only of conjugated systems or was due solely to the ethylene bond. The latter has been considered the true explanation, with the effect of the conjugation being only one of degree. The establishment of this fact has been an outgrowth of the following experimental results.

Dibenzyl has been isolated as the principal product from the reaction of each member of the following series with an excess of benzene and three moles of aluminium chloride. (a) Stilbene; *p*-chlorostilbene; *p,p'*-dichlorostilbene; *p*-bromostilbene, and *p,p'*-dibromostilbene. (b) 1,1,2-Triphenylethene and 1,1-di-(*p*-chlorophenyl)-2-phenylethene. (c) Tetraphenylethylene. (d) Diphenylacetylene.

Production of Dibenzyl

The production of dibenzyl from compounds such as 1,1-di-(*p*-chlorophenyl)-2-phenylethene, and *p*-chlorostilbene, involved a replacement and a complex cleavage of aryl groups, and an addition of hydrogen. These processes were comparable to those encountered in the preceding section.

On the other hand, when only three-tenths of a mol. of aluminium chloride was used, the following results were obtained: 1,1,2-triphenylethane was produced from stilbene and from *p*-chlorostilbene by a process which was easily recognised as a reversible addition of benzene. An analogous process was responsible for the production of -tetraphenylethane from 1,1-di-(*p*-chlorophenyl)-2-phenylethene. from 1,1-diphenyl-2-phenylethene and from diphenylacetylene. The 1,1,2-triphenylethane and the tetraphenylethane, so produced, were subsequently converted into dibenzyl by the use of three moles of aluminium chloride.

In these cases including aryl ethylenes and acetylene a reaction was undergone which involved, besides the reversible addition of benzene, a more complex process. This process accounted for the isolation of an ultimate product which contained only two aryl groups. The ability of these reactions to take place was dependent upon the amount of the catalyst: the reversible additions of benzene taking place under the influence of a small amount of aluminium chloride, and the addition of hydrogen under the influence of a large amount of the same catalyst.

An Irreversible Reaction

The production of dibenzyl was then due to the fact that at some point, or in some phase, an irreversible reaction had been invoked. On the basis of the former evidence on the reversible character of the addition of benzene, it was immediately deducible that the irreversibility was involved in the addition of hydrogen. The process, then, obviously involved a cleavage of benzene, addition of hydrogen to the unsaturated linkage, and a repetition of the process until dibenzyl was formed.

It was further concluded that the formation of dibenzyl was to be expected from any aryl ethylene or acetylene derivative which bore at least one aryl group on each carbon atom and for similarly constituted tri- or tetraphenylethanes. It was obvious that dibenzyl would result also from any halogen substituted ethylene, or ethane which reacted with benzene to form an aryl ethane or ethylene suited to the generalisation given above.

* An abstract of a thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Chemistry in the Graduate School of the University of Illinois, 1936.

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[5] Eaton, Black and Fuson, *Ibid*, (1934), **56**, 687.
[6] Weinstock and Fuson, *Ibid*, (1934), **56**, 1,241.
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A NEW tung oil concern with a capital of £10,000 has been founded in Sydney under the title of the Tung Growers Oil Corporation, Ltd.

Plastics in the Manufacture of Armaments

The Importance of Reduced Weight

SPEAKING on "The Production, Application and Characteristics of Various Moulded Plastics suitable for General Engineering Purposes," at a meeting of the Manchester Association of Engineers, on January 8, Mr. A. R. Dunton said the best conception of the length and breadth of the scope of plastic materials had recently been evident by viewing the exhibits of the first modern plastics competition in America, where an even greater variety of examples was presented than those seen at the last British Industries Fair. Some of the outstanding features were marvellous designs of a decorative nature incorporated into panels for the internal splendour of luxury liners or for public lounges.

In connection with modern industrial requirements, there was a definite trend towards replacing old-established materials with many of the new products now available, as, for instance, the housing or encasing of the assemblies associated with scales, where in some cases a 66 per cent. saving in weight had actually been obtained, coupled with the permitted selection of numerous pleasing art shades.

In the automobile industry, a change was rapidly taking place, and on many cars the internal fittings, window-frames, instrument panels, high voltage distribution systems, etc., were all made from synthetic resin materials, instead of metal. There was no reason why this trend should not embrace most of the body work and especially such items as sunshine roofs, mud-guards, radiator housings, and complete door assemblies. The aeronautical industry offered almost unlimited scope for the application of plastic mouldings.

For transmitting power, gear-wheels made from laminated plastics had proved themselves durable and silent. Specialised varieties of the same type of material were being used for the manufacture of bearings for heavy steel rolling mills, where water instead of oil was being extensively used for lubricating purposes. In some cases during the fabrication of these bearings, graphite was also introduced so as to reduce friction, making it possible to use water lubrication only for speeds up to 200 ft. per minute and loads up to 1,500 lb. per sq. in. In many cases a power saving ranging from 30 to 60 per cent. had been obtained, with life increase up to as much as ten times the usual life experienced with other types of bearings.

Although the use of plastics for armament purposes had only been entertained to a moderate degree, there was no doubt that the improved knowledge associated with plastics would produce great changes in the near future. The idea of using plastics for the rapid production of artillery wheels was worth consideration, since these could be produced with the strength desired combined with an enormous saving in weight. Even in the case of explosives, moulded shells or bombs could be produced in their thousands during the period which it now took to produce hundreds. Again, the reduction in weight of an ordinary army rifle which could be achieved by the correct use of shock-proof plastics made research in this direction desirable.

In practically every case, weight meant cost either for material employed, facilities for supporting it, or transportation costs. In the case of aircraft, reduction of weight was so essential that in many cases a higher cost of raw materials was quite permissible. In the automobile industry, extra weight meant a continuous extravagance of power throughout the whole life of the car.

There were so many directions in which plastic materials could be considered, and so many queries which arose, that it was necessary to provide facilities for solving these problems. Special provision had therefore been made in the research laboratories of the Metropolitan-Vickers Electrical Co. for dealing with any type of future problem, and special equipment had been installed which made it possible to subject various moulding powders to high vacuum drying, impregnation up to 4,000 lb. per sq. in., or, if desired, pressure work up to 500 tons. Various climatic conditions were also catered for, which might include observations under constant or variable temperatures for dry, humid, tropical or sea mist atmospheres. Similar laboratories were being equipped in America and on the Continent, all of which clearly indicated the progess which was to be expected in the use of plastics.

Aluminogel: Its Manufacture and Properties

A New Alternative to Silica Gel

HITHERTO silica gel has been used almost exclusively as the solid adsorbent for the drying of air and gases, as other known solid adsorbents of equal drying efficiency have not been available. In "Angewandte Chemie" of June 6, 1936, however, Dr. Eng. H. Brückner and Dipl. Eng. L. Hirth gave particulars concerning a new solid adsorbent known as "aluminogel," which appears to be a valuable material for drying air and other gases.

The gel obtained by precipitating aluminium hydrate from a solution of aluminium chloride or sulphate by ammonia, filtering, washing, and drying the precipitate, is actually an oxyhydrate of aluminium with loosely combined crystals in the filter cakes. By compressing this under a pressure of 50-100 atm., solid blocks or sticks of the material are obtained which, when more or less de-hydrated by heat treatment, can be used to dry gases. When the precipitation of the aluminium hydroxide is made under conditions to yield a colloidal precipitate, the dried gel possesses an amorphous structure similar to that of silica gel. So prepared, the gel has an advantage over the compressed product in containing a much greater number of fine capillary tubes, and thus a greater active surface. In the precipitation from aluminium salt solutions of different concentrations with excess of ammonia, the upper limit of concentration in aluminium ions is about 2 per cent., independent as to whether the precipitation is made at ordinary or a higher temperature.

After the precipitate has settled, it is washed several times by decantation and then transferred by suction to a draining surface where it is washed again with hot water and dried, these operations being effected with the greatest speed possible in order to avoid "ageing" and thereby crystallisation in the gel. If the precipitation is made with a small excess of ammonia, or if highly concentrated salt solutions are employed, the tendency is towards crystallisation of the gel which reduces its drying efficiency. Washing of the precipitate with hot water makes filtering easier and more effectively removes the entangled ammonia salts. In order to prevent the breaking-up of the filter cakes in drying, the drying operation must be carried out slowly by gradually increasing the drying temperature. The drying operation can be considerably shortened by using methyl or ethyl alcohol for the final wash.

Aluminogel prepared in this way is a semi-transparent hard material, very resistant to abrasive action, but it is brittle enough to be easily reduced to the required sizes. The loose weight of the gel broken down to 2-3 mm. size, dried at

300° C., amounts to 750 kg. per cubic metre, compared with 550 kg. per cubic metre for silica gel.

After complete drying, the compressed crystalline form, as well as the amorphous gel, is freed from the greater part of the water of hydration which requires from two to three hours heating at temperatures ranging from 200 to 600° C. By observing the above mentioned conditions, a completely amorphous gel is obtained, in contrast to the crystalline oxyhydrate obtained by treating bauxite. The gel can be heated to 800° C. without changing the structure; only most of the chemically combined water escapes, but if the heating is carried beyond 800°, the product is gradually, and at 1,200° completely converted into alpha-alumina or corundum, which is not affected by exposure to air and only returns to the hydrated condition when boiled with water under pressure at 200° C.

Speed of Adsorption

Comparison of the drying action of the amorphous gel and compressed partly crystalline gel, and other well known drying agents, has established the influence of the activating temperature as affecting the drying action of the gels. Quantities of 5 grams of the gels, activated at 200°, 400°, and 600°, were tested. The speed of adsorption, as well as the total quantities of moisture adsorbed, were considerably in favour of the amorphous gel as compared with the compressed gel. After the test had lasted 100 hours, it was obvious that the amorphous gel had very considerably more drying action; at first the adsorption by the material activated at 200° was the greater, but after a time, it was less than by the gel activated at 400°. With gel activated by drying at 600°, there was already some contraction of the active surface and thus a diminution in the drying activity.

The experiments were continued for 200 hours, by which time all the materials under test were practically saturated with moisture. The total water acceptances in percentage by weight are as follow:—

Temp. of drying	200° C.	300° C.	400° C.	500° C.	600° C.
Amorphous gel	32.5	33.0	35.0	39.0	35.5
Compressed gel	19.0	22.0	23.5	25.5	21.0

The dependence of the water acceptance on the activating temperature in determined time periods was ascertaind. With additional adsorption time the maximum water acceptance changed from the lower to the higher temperature activated gels up to a limiting temperature of about 500° C.; above that temperature the alpha-alumina begins to form.

Selection of Activating Temperature

According to the purpose for which the gel is to be used, the activating temperature can be selected. It may be mentioned that silica gel behaves very similarly to aluminogel, except that the rate of water acceptance in the beginning is slower. This gives the amorphous alumia gel a superiority, although the total water acceptance of the silica gel is greater. A comparison of the water acceptance of well-known drying agents, such as calcium chloride, barium perchlorate (dried at 300° C.), and concentrated sulphuric acid, with aluminogel and silica gel (dried at 300°) showed that while these could absorb more moisture than aluminogel or silica gel, the sulphuric acid increases in volume corresponding to the water absorbed, while the other materials named became deliquescent. Aluminogel, on the contrary, is very stable and shows no mechanical change in taking up water, or when regenerated into activity by two to three hours heating.

The adsorption ability of aluminogel and silica gel in removing moisture from air was tested by exposing these to moisture-saturated air at 20° C. The air was caused to flow through 50 grams of each of the gels at rates ranging from 50 to 100 litres per hour, the gels having been activated at 300°. From the air samples were taken currently and tested for remaining moisture by absorption in calcium chloride.

The tests showed that 100 per cent. drying both by aluminogel and silica gel was not maintained after the gels had become 7 per cent. loaded with moisture. The drying action of the silica gel fell more quickly than that of the aluminogel, so that the latter showed considerably greater air-drying efficiency; even after the loading had reached 15 per cent. the aluminogel still possessed a drying action of 28 per cent. The drying action reached 100 per cent. so long as the internal parts of the aluminogel pieces retained full adsorption capacity. The drying action of the aluminogel, however, is so perfect in the beginning stage that calcium chloride (dried at 300° C.) used to absorb the remaining moisture in the air showed negative results.

Judging by these tests, aluminogel should be a valuable and economical addition to the list of commercial solid drying agents for air and gases.

Midland Tar Distillers

New Offices at Oldbury

THE Midland Tar Distillers, Ltd., have transferred their head offices to Oldbury, Birmingham, where new offices have been built on modern lines.

The lay-out of the new offices has been arranged to give one large general office, surrounded by a number of private offices, with a main central entrance hall, and staff entrances on each wing.

Adjoining the office is the company's largest works, where considerable alterations and additions are nearing comple-

The new Offices of Midland Tar Distillers, Ltd., at Oldbury.

tion. These include a complete new distillation plant—the first one of its kind to be erected in this country for the distillation of tar.

The company purchases and distils the output of crude tar from about 100 gas undertakings on a co-operative basis. For this purpose it maintains works at Oldbury, Birmingham, Spondon, Banbury, Wolverhampton, Milton, Queensferry, Brownhills, Dunstable and Welshpool. These works serve also as manufacturing and distribuing centres for road tar and allied compounds produced to comply with many different specifications. The company's business in this direction is larger than that of any other distiller in the country.

The company was formed in 1923, when a number of tar distilling and chemical businesses were brought into the amalgamation; these incuded Lewis Demuth and Co., Ltd., Joseph Turner, Ltd., Brownhills Chemical Works, Ltd., and the tar distilling businesses of Robinson Bros., Ltd. and Major and Co., Ltd.

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The Nickel Industry in 1936

New Records in World Consumption

STATISTICS for the first ten months of 1936 indicate that the current year will establish new records for the nickel industry in the volume and diversification of world consumption, states Mr. Robert C. Stanley, president of the International Nickel Company of Canada, Ltd. Because of the increase which has been steadily maintained in the demand for nickel since the low point in 1932, important additions to productive capacity were made during the year in Canada, the United Kingdom, the United States and elsewhere.

World consumption of nickel in all forms during the first ten months of the year attained a total of some 162,000,000 lb., an increase of more than 20 per cent. over the corresponding figure in 1935 which had established a new record for the industry. This current consumption compares with 112,000,000 lb. in the first ten months of 1929. Whereas a factor in the 1935 increase in consumption was the policy of industry to build its stocks back to normal in anticipation of better business, analysis of world consumption indicates that the replenishment of reserves had been generally accomplished by the end of 1935 and that nickel has been going this year directly into an industrial world whose production is moving at a definitely accelerated pace.

British Progress in Plant Design

The rapid progress in plant design and equipment made recently in England and in other parts of Europe gives definite promise for the future. Metallurgical works in Sweden are rapidly taking a place among the most efficient in Europe as regards methods, plant and technique. The British non-ferrous industries also have improved their plant and equipment during the last two or three years, as is evident in the new rolling mills, wire and tube drawing benches and particularly in extrusion presses.

An interesting development in Great Britain during recent years has been the increased expenditure on industrial research, not only in the plants of individual firms, but also through joint effort by sections of industry. Of significance to the nickel industry are the central organisations for research which have been set up by the steel, cast iron, non-ferrous and automobile groups. Each of these has become responsible for wide programmes of research both in their own laboratories and in various other research establishments throughout the country.

Usefulness of Research Laboratories

The nickel industry is giving this movement full co-operation because not only are these organisations developing much useful information regarding nickel-bearing materials, but their investigations of technical problems can only result in good to industry generally. The Mond Nickel Co.'s new laboratory at Birmingham is one of the largest in Europe to be maintained by a single firm solely for metallurgical research. With a similar laboratory at Bayonne, New Jersey, and with the one now under construction at Copper Cliff, Ontario, it provides the nickel industry with comprehensive and well integrated facilities for the study of metals and alloys.

The steel industry, which is the dominant consumer of nickel, broadened its markets during the year and in consequence substantially increased the use of nickel alloy steels. New compositions of nickel alloy steels in the form of sheets, plates and other mill products for structural purposes, not available heretofore, and now being marketed in considerable tonnages under a long list of trade names. Of low alloy content and low cost, these products offer improved corrosion resistance and better physical properties which have led to their use in the construction of railroad freight car bodies and other equipment where light weight and improved performance are desired. The general acceptance of these newer steels has aready been reflected in the increased consumption of nickel in this field.

Stainless Steel

Of interest have been the advances made in the stainless steel industry during the past year. Not only is more nickel being used, but the standards of quality of finished sheet and strip produced by the principal manufacturers are being raised steadily. In addition to these two conventional products in the stainless steel series of alloys there is a marked increase in the output of wire and tubes, and the production of special alloy compositions suitable for machining has further expanded consumption.

Progress in this section of the nickel consuming industries has definitely broadened its base. It is perhaps more obvious in Great Britain than in other European countries, and it is worthy of note that Sweden has made rapid advances. The expanding use of the stainless steels has been noticeable in France as well, and in Belgium the increased interest taken in these nickel-bearing alloys is reflected in their use in important bridge and dam construction.

In Great Britain the standards governing nickel plated deposits have been improved appreciably, due in large measure to the research work which is being conducted under the auspices of the British Non-Ferrous Metals Research Association. The result is reflected in the 40 per cent. increase in the sale of nickel anodes during 1936 as compared with 1933. In France the comparable increase was 20 per cent.

Consumption of nickel in plating is being stimulated further by the advent of bright plating. While still in the early stages of application in the United Kingdom and in Europe generally, the process is making substantial progress in the United States.

Materials for the Chemical Industry

Never before has the attention of the chemical industry been so clearly focused on the problem of material suitable for its equipment. During the year chemical publications discussed the qualifications of various metals to meet the requirements of the industry, the American Chemical Society devoted a general symposium to new corrosion resisting metals and alloys and published a monograph on the subject, and the British Institution of Chemical Engineers featured the same topic at its meeting in London last June.

Monel metal, nickel, nickel-clad steel, stainless steel and similar alloys are called on to meet an increasing number of special requirements in the chemical industry. Significant progress in the use of inconel was noted, and nickel cast irons for structural parts continued a steady advance. In all cases the combination of strength, durability and corrosion resistance offered by these materials was a controlling factor in their selection. Corrosion resistance is regarded as important both because it make for more durable and efficient equipment and also because corrosion frequently can cause contamination of products.

Exemplifying the use of nickel by the chemical industry are special containers used to handle chemicals, salt water and other corrosive materials. In these practically the entire range of nickel alloys is used—monel, stainless steel, nickel silvers and Ni-Resist among others. During the year increases in the use of nickel alloys for pump casings, rotors, shafts and other applications were reported. Popular materials for shafts are monel metal and stainless steel. Nickel cast iron is used for retorts, filters, evaporators and similar parts, as well as for structural parts exposed to the splash of corrosive materials.

The coke and gas industries are both enlarging their use of the nickel cast irons. Ni-Hard is extensively applied for

crushing, conveying and sizing of coke. Lower alloyed heat and corrosion resisting cast irons are employed for ovens, generators, and condenser and by-product equipment. A new process for the production of chlorine without the production of caustic soda as a by-product required a large tonnage of nickel for equipment. The production of caustic soda itself accounted for increased consumption of nickel and nickel-clad steel in the alkali industry and in the production of potassium carbonate.

The fibre industry has found monel a satisfactory material for evaporator tubes used in concentrating zinc chloride as well as for covering rolls in other processes. K Monel pump rods and plungers have been adopted for high pressure carbon dioxide compressors. The use of nickel and nickel-clad steel has increased with the rapidly growing plastic, resin and synthetic rubber industries.

The Petroleum Industry

The petroleum industry offers one of the broadest fields for demonstrating the usefulness of nickel in modern industrial processes, and the growing variety and volume of nickel alloy applications are indicative of the metal's acceptance by this industry.

Wide variations occur in the corrosive conditions of the oil industry. Refining processes are working towards lower temperatures for the dewaxing of lubricating oils and higher pressures for the cracking of gasoline. Distillates and other by-products are recovered and processed under varying degrees of corrosion. In seaboard refineries the necessity for using brackish waters presents additional problems of corrosion. Thus the choice of materials for the vital parts of equipment varies with the operating conditions present in each individual situation, but it is noteworthy that nickel alloys are being used throughout the whole fabric of the oil industry.

The use of nickel steels containing from $2\frac{1}{2}$ to $3\frac{1}{2}$ per cent. of nickel for the construction of pressure vessels and auxiliary equipment employed in low temperature dewaxing operations of oils has continued and may be considered standard material. These steels have responded satisfactorily to the usual fabrication operations involving welding and, so far as known, have performed well in service.

Bubble Caps and Trays

The use of Ni-Resist bubble caps and trays has broadened, and further extension is expected. Ni-Resist has made a good showing in refineries handling Michigan crudes, in resisting the hydrochloric acid liberated during distillation. The use of Ni-Resist liners to handle refluxes, naphthas and acid sludge has increased markedly. Ni-Resist is also giving satisfactory service in cooling sections, valves in acid sludge lines, and valves for compressors and pumps. K Monel pump rods and monel valves are being employed increasingly in refineries. Valves of the stamped disc type are considered an important contribution to pumping and have increased the efficiency of pumps handling gasolines and light fractions.

Both monel and nickel are used in producing many petroleum by-products such as chlorinated paraffin, petroleum alcohols and the like. Inconel is now being used in the production of resins from petroleum bases. Sulfonated oils, hitherto produced entirely in lead equipment, are now usually processed in monel vessels.

Density Hydrometers

New British Standard Specification

THE British Standards Institution has just issued a new specification entitled "British Standard Specification for Density Hydrometers."

The committee entrusted with the preparation of standard specifications for hydrometers found that there are in common use a large variety of hydrometers, for example, density hydrometers, a considerable number of different specific gravity hydrometers, twaddle hydrometers, lactometers and salinometers of various types, Baumé hydrometers, saccharometers, etc. The committee came to the conclusion that any attempt to standardise hydrometers type by type would tend towards perpetuating a state of quite unnecessary confusion rather than towards achieving simplicity and uniformity. They were, therefore, driven to consider the whole question of hydrometers and hydrometry from first principles.

The committee adopted the view that the true function of a hydrometer is the determination of density and that the correlation of density and percentage composition, or other property directly related to density, can best be carried out by means of appropriate tables. The hydrometers and tables together then provide a simple logical system of hydrometry of very wide application. The committee has therefore concentrated its activities on providing a standard specification for density hydrometers and on compiling appropriate tables for use with such hydrometers.

The hydrometers are adjusted to indicate density—mass per unit volume—in grams per millilitre at 20° C. The basis of the scale is thus entirely free from ambiguity and is expressed in universally recognised units. A wide choice of hydrometers is provided of varying range and accuracy, and The National Physical Laboratory have made arrangements for testing hydrometers for conformity with the specification.

The hydrometers have been designed so that changes in reading due to changes in surface tension are as small as practicable. The surface tension for which each hydrometer shall be adjusted is specified, and simple correction tables are given for use when the hydrometers are read in liquids having surface tensions different from those specified should the accuracy desired render the application of these corrections necessary. Temperature correction tables and tables for use in the measurement of liquid in bulk are also included in the specification.

Tables giving, over a temperature range generally from 10° to 40° C., the density and composition of a number of liquids including sugar solutions, sodium chloride solutions, caustic soda solutions, sulphuric acid, hydrochloric acid and nitric acid are in course of preparation and will be published separately. The tables correlate density and percentage composition and so can be used not only in conjunction with the standard hydrometers, but also with any other method of determining density.

The committee will willingly consider suggestions for the preparation of tabes for other liquids of industrial importance and every endeavour will be made to provide any table considered to be of use to industry.

Copies of this specification (B.S.S. No. 718) may be obtained from the British Standards Institution, 28 Victoria Street, London, S.W.1., price 3s. 8d. post free in Great Britain and Ireland, or 3s. 10d. post free overseas.

THE Japanese output of iodine in 1934 is officially reported as 37,157 kilos, valued at 341,333 yen, showing declines of 7,900 kilos in quantity and 190,536 yen in value compared with the previous year. The 1934 production of potassium iodide totalled 55,881 kilos, valued at 590,902 yen, a decline of 1,637 kilos and 56,314 yen, respectively, compared with 1933.

New Technical Books

THE TECHNOLOGY OF PLASTICS. By Herbert W. Rowell. Pp. 206. Plastics Press, Ltd.

This book provides in simple form the essential technical particulars of a comparatively new industry. It is intended for the use of those who wish to know what "plastics" really are, and how they are manufactured. The attempt is made to cover broadly the composition, properties and manufacture of the mouldable and moulded plastics on the market, without touching those which are in the experimental stage, or more than mentioning uses for plastics outside the moulding industry. Chapters on heat transfer, plasticity and the like, are inserted, while a chapter on hydraulic plant is an example of first principles mixed with what has been proven by experience to be sound technical practice.

* * *

ALUMINIUM PAINT AND POWDER. By Junius D. Edwards. Second Edition. Pp. 216. Reinhold Publishing Corporation (Chapman and Hall, Ltd.). 22s. 6d.

Research and development created the fundamental background of knowledge and experience on which is based the present extensive use of aluminium powder. Progress has been correspondingly rapid and it is little wonder that the first edition of this book, although published only nine years ago, should be inadequate for the paint technologist of to-day. In the new edition a substantial share of the technical information results from the work of the author's associates in the Aluminium Company of America, and to them much credit is due for placing aluminium powder in the ranks of commercially important paint pigments. Research in all lines of paint technology has made great advances in the past ten years, and many investigations in other fields have been of practical value in the formulation, application and testing of aluminium paint.

* * *

PRACTICAL ORGANIC CHEMISTRY. By Frederick G. Mann and Bernard C. Saunders. Pp. 403. Longmans, Green and Co. 8s. 6d.

This laboratory manual of organic chemistry has been compiled primarily to cover the work required for Part I of the Natural Sciences Tripos at Cambridge University, the general B.Sc. course at London University, and the Pass Degree courses at other universities. At the same time it has been carefully arranged to cover adequately the needs of students proceeding to the M.B. examinations in organic chemistry at the various universities. The whole of the experimental work described in this book has been repeatedly checked by the authors in order to obtain the desired results with a minimum expenditure of materials and time. In the section on organic preparations in particular, this detailed investigation of each preparation has frequently enabled unexpected simplifications and economies to be introduced, more particularly as many text-books still contain experimental directions which have frequently remained unchanged since their original publication in chemical journals many years ago. The description of most experiments, and particularly of the preparations, is preceded by a short account (in small print) of the chief theoretical considerations involved; in the case of preparations based on one of several alternative methods, a brief account is similarly given of these methods and of their comparative practical value. This combination of theory and practice should simplify and elucidate the practical study of organic chemistry, and enable the student to visualise his practical work as an orderly whole and not as a vast number of isolated and unrelated experiments. The section on reactions and identification of organic compounds has been strictly limited to the commoner members of each of the more important classes of organic compounds. This part of the book, consisting chiefly of reactions carried out on the test-tube scale, should be of great value to the student, who in carrying out the reactions intelligently should effectively consolidate his theoretical knowledge. A section on simple enzyme reactions is rather a new departure in practical books of this type; the importance of this information to medical students and biochemists, however, is obvious.

* * *

IONS IN SOLUTION. By R. W. Gurney. Pp. 206. Cambridge University Press. 10s. 6d.

In the study of ions in gases a rapid advance was made after 1913, when Bohr directed attention to their electronic energies; in fact our knowledge of atomic ions is already nearing completion. The present book has been written in the belief that a similar step forward may now be made for ions in solution, if their behaviour is interpreted by methods such as those which are outlined.

* * *

THE AROMATIC DIAZO-COMPOUNDS AND THEIR TECHNICAL APPLICATIONS. By K. H. Saunders. Pp. 224. London: Edward Arnold and Co. 12s. 6d.

If all the papers and patents which have been published on diazo-compounds in English, French and German were printed seriatim, a volume of some 15,000 quarto pages would result. The present writer has attempted to condense such a mass into some 250 pages, not for the benefit of chemists who have had wide experience of diazo-compounds, but for the larger number who seek an introduction to this field of academic and industrial activity, or who wish to be informed of the directions in which progress is taking place. As regards the patent literature, the author has used English scripts as the basis of discussion, and has given the foreign equivalents where known to him, but he has not made search to ascertain that the list of foreign equivalents is complete. In compiling this work the author has been much indebted to Professor A. G. Green, F.R.S., for guidance, particularly on points pertaining to the history of the development of diazo-compounds.

The Gifts of Science

Sir R. Gregory on the Abuse of Discovery

SIR RICHARD GREGORY, speaking before the Association of Women Science Teachers in London on January 7, said that abuse of scientific discovery was as preventable as was disease, and that we could make the world a celestial dwelling-place if we so wished.

Science offered mankind the means of making a new heaven and a new earth, but whether the change would bring about increased happiness would depend upon people themselves. Science poured its riches into the lap of man, but it could not be held responsibe for their use. If its fruits had not brought happiness, the fault rested with the community and not with the explorers of scientific fields.

The true message of science was not in the bomb or the earthquake, not in the mighty, rushing wind or the roaring fire, but in the still small voice from the laboratory or study. Scarcely any scientific research was carried on with the deliberate purpose of producing instruments or processes "to kill and put down noble life," as Ruskin once suggested. When a nation asked for high explosives chemists could provide them, but by far the greater part of their work had other intentions.

Sir Richard referred to the lives saved by the use of antiseptics and the relief from pain provided by anæsthetic. It was to advantages of this kind that one would point when science was being associated only with destructive agencies and with the demoralising influence of industrial slums.

Chemical Notes from Foreign Sources

Manchukuo

THE Manchurian Chemical Industry Co. announces a net profit of 900,000 yen for the six months from April to October, 1936.

Russia

WORK has now started on the erection of the artificial corundum factory at Czernorecze which is expected to be ready for production in a few months.

Norway

THE Molybdene deposits recently discovered near Lier, Royken, Hurum and Stromm are to be exploited by a new company, registered at Bergen as Ugelstad Molybdengruber, Ltd., with a share capital of 100,000 kroner (over £5,000). A factory is being erected at Gullaug, and will be ready to commence operations in February. It will have an initial output of 120 tons a year.

United States

A NEW method of manufacturing caustic soda has been developed by Autoxygen, Inc. A concentrated solution of the salt is sprayed into a hot organic liquid such as kerosene, which boils away with the water from the solution, leaving anhydrous crystals, free from the impurities such as sodium carbonate and common salt which are usually present in caustic soda produced by the usual evaporation process.

Austria

CHEMICAL products for the shoe and leather industries will be made by the Wega Chemische Fabrikations-Gesellschaft m.b.H. of Atzgersdorf (capital 200,000 schillings).

AN effective soap has been produced from naphthalene derived from Austrian brown coal. The discoverer of the process is a Vienna chemist, Dr. Herbert Kraus, and he claims that "Hand-lave" is more effective in removing oil, tar or soot than any ordinary soap, and 66 per cent. less fatty material.

Germany

THE mineral resources of Thuringia will be subjected to close scrutiny by the newly-formed Thuringische Rohstoff A.-G. (capital 1 million marks).

THE German Fluorine Association and the Ossig Chemical Union of Czechoslovakia are members of a cartel to regulate the prices in the two countries of hydrofluoric acid, sodium fluoride, ammonium bifluoride and potassium bifluoride.

A SYNTHETIC petrol manufacturing plant is to be constructed by the newly-formed Chem. Werke Essener Steinkohle A.-G. (capital 12 million marks), an offshoot of the Essener Steinkohlenbergbau A.-G. and the Harpener Bergbau A.-G. of Dortmund.

Japan

A PLANT for making refined naphthalene is being built at Kasugade by Nippon Senryo Seizo K.K.

AN artificial corundum factory has been started up in Kumanoto province by Tokai Denkyoku K.K.

A NEW process for extracting industrial salt from seawater is under investigation at the laboratory of the Salt Monopoly in Mukojama.

ALUMINIUM is recovered in a new process for producing potassium sulphate from the end liquors of salt extraction, based upon treatment with aluminium sulphate.

THE estimated annual production figures of the new State-subsidised hydrogenation concern within the next seven years are now given as two million tons petrol and heavy oil. To encourage synthetic petrol manufacture the concern will recoup producers with the difference between production costs and market price.

Roumania

ACETIC acid will be produced by the Acetum Co. of Arod, recently founded with a capital of 800,000 lei.

Hungary

REFINED sulphur is to be manufactured by the Metallochemia Co. which hopes to replace imports entirely. The company has come to an agreement with the State copper mines at Resc, giving it the sole right to manufacture the pyrites coal powder.

France

AMONG new companies recently registered are: Union Pharmaceutique Française, 70 Avenue de la Republique Paris, capital 25,000 francs (trade with chemical and pharmaceutical products); Soc. générale des textiles artificiels, 5 Avenue Percier, Paris, capital 2,500,000 francs (participation in chemical and textile enterprises).

Gas Masks for Civilians

Factory Opened at Blackburn

MR. GEOFFREY LLOYD, Parliamentary Under-Secretary for the Home Department, formally opened the Government-owned factory for assembling the containers of gas masks, at Blackburn on Tuesday. These are being mass produced in numbers sufficient for the civilian population of the kingdom. The factory, which is already employing 360 persons, mainly young women, and will absorb another 100 persons, is believed to be the only one in existence engaged on the production of gas masks for a civilian population. All the components required for the containers are sent from the separate manufacturers of each article in different parts of the country. The Blackburn factory produces the container by assembling its parts.

Mr. Lloyd, in declaring the factory open, said that the Government considered that in time of war everyone ought to have a gas mask, whether they had money to buy one or not. That was the reason why this factory had been established for the mass production of gas masks. It was hoped they would never be needed, but if they were the Government would issue them free of charge to everyone in danger. These gas masks would stop every poison gas known to the Government which could be used in war.

During a tour of the works, which are already in full operation, the party saw how the efficiency of the containers is tested on the bench by means of special pumps, each with a liquid indicator. When passed, the charged containers are placed in cardboard cylinders and the cylinders in cartons for dispatch to storage depôts. At the same time the face-pieces of the masks, being of rubber, are separately stored elsewhere in an inert gas which will protect the rubber from deteriorating for a long time, but there will be periodic tests of both face-pieces and containers to ensure that they are in good condition. It was stated that the charge in a container will, in use against a gas attack, last for from 36 to 48 hours. The factory output of containers will in a few weeks amount to 500,000 a week, and at least 30,000,000 will be made there. The regional depôt for gas mask storage and distribution has been established at Manchester, and there the containers assembled and filled at Blackburn will be brought together with the rubber face-pieces which are required to complete the whole gas mask.

THE heavy chemical industry of Canada made considerable progress in 1935, production reaching a figure of over 19 million dollars, with a gain of 15 per cent. over 1934. Products made for the first time included disodium and trisodium phosphate, liquid hydrogen peroxide, lead acetate, iso-butyl acetate and some bleaching materials.

Personal Notes

MR. WILLIAM SOMERVILLE, of Bonnyrigg, Scotland, a retired glue manufacturer, left estate in Great Britain valued at £22,658.

MR. ROBERT MORRIS, who has been associated for half a century with R. W. Stewart and Co., Ltd., died last week at his home in Methven Drive, Dunfermline. He joined the office staff as a boy and rose to be managing director of the rubber works. His death followed an attack of influenza, and he is survived by his wife and a son.

MR. A. A. TAYLOR, hon. secretary of the North-Western Section of the Institute of Fuel, has been compelled to resign his position on account of his having been appointed to the Gas Research Fellowship at Leeds University, and Mr. A. McCulloch, of the Manchester College of Technology, has taken over these duties pending another appointment.

MR. RICHARD CHARLES BAKER, who founded Borax Consolidated, Ltd., 38 years ago, died in a London nursing home on Tuesday, at the age of 79. Borax Consolidated Ltd., which has an issued capital of £2,550,000, has extensive properties in various parts of the world. Mr. Baker first founded, in 1898, a company known as the Pacific Borax and Redwood Chemical Works, in London, in which British and American interests were united. A year later the present company came into existence and Mr. Baker was appointed managing director. He had acted in that capacity ever since.

MR. LAWRENCE JOHN DE WHALLEY, who died at Orpington on Sunday, aged 83, was one of the founders of the Chemical Club and a Fellow of the Institute of Chemistry and the Chemical Society. Educated at the Royal School of Mines, where later he was chemical laboratory assistant under Frankland, he was for a time engaged in paper manufacture. Then, for 40 years, until his retirement in 1930, he was sugar chemist to Tate and Lyle. He was the father of 12 children, a prominent Freemason, and a man with varied interests that included mathematics, the classics, and gardening. Six years ago the Society of Chemical Industry presented him at its jubilee with a commemorative plaque.

MR. THOMAS CROOK, O.B.E., of Downs Court Road, Purley, principal of the Mineral Resources Department of the Imperial Institute, and one of the best-known geologists and economic mineralogists in the British Empire, died last week after an operation. Mr. Crook first joined the staff at the Imperial Institute in 1906, and became a frequent contributor to its publications. He left the institute in 1919 to become chief of the intelligence and publications section of the newly formed Imperial Mineral Resources Bureau. Upon the amalgamation of the bureau with the mineral section of the institute in 1925 he became vice-principal of the new Mineral Resources Department, and in 1928 its principal. He was the author of several volumes and many papers on mineralogy. For many years he served on the councils both of the Geological Society and the Mineralogical Society.

MISS ZOE ELIZABETH LOVERING, elder daughter of Mr. J. S. Lovering, of Polkyth House, St. Austell, was married to Mr. Ronald A. G. Varcoe, younger son of Mrs. Varcoe and the late Mr. R. Grosvenor Varcoe, of Carlyon Bay, St. Austell, at St. Austell Parish Church on January 9. Considerable interest was evinced in the union of two distinguished china clay families and there was a very large congregation present. The bridegroom's father was associated with English Clays, Lovering, Pochin and Co., Ltd., before his death a few months ago, and previous to that was a director of Varcoe's China Clays, Ltd., and William Varcoe and Sons, of Stoke-on-Trent and St. Austell. The bride's father has been prominently identified with the china clay industry all his life, as one of the directors of John Lovering and Co., Ltd., and latterly in connection with Lovering China Clays, Ltd., now merged into English Clays, Lovering, Pochin and Co., Ltd. The bridegroom is the manager of the ball clay works at Newton Abbot.

MR. JOHN MITCHELL, of Chorley, Lancashire, retired cotton waste bleacher, who died on November 2, aged 81 years, left £1,162 with net personalty nil.

PROFESSOR LOUIS M. DENNIS, emeritus professor of chemistry at Cornell University, an authority on the analysis of gases, has died at the age of 73.

MR. MARTIN EDWARD WALSTON, of Seine et Oise, France, and formerly of Tunbridge Wells, bequeathed £1,000 to the Society of Chemical Industry for the benefit of its building fund.

MR. W. H. HEMSELL AND MR. G. W. DARNES, secretaries of T. W. Mays and Sons, Ltd., and Mays's Chemical Manure Co., Ltd., have been appointed to their respective boards of directors.

LORD DUDLEY GORDON has been appointed chairman of J. and E. Hall, Dartford, makers of refrigerating machinery, in succession to Mr. H. J. Ward, who has resigned, but will continue to be a director of the company.

PROFESSOR E. B. BAILEY, F.R.S., Professor of Geology in the University of Glasgow, has been appointed director of the Geological Survey of Great Britain and Museum of Practical Geology. Professor Bailey served on the staff of the Geological Survey from 1902 until December, 1929, when he resigned from his position of District Geologist on appointment as Professor at Glasgow.

MR. HUGH M. HODGART, a well-known Paisley business man and former Army officer, died on January 9 at his home, Westerly, Meikleriggs. He was a director of Fullerton, Hodgart and Barclay, Ltd., engineers and ironfounders. He was the first of three brothers to have command of the Paisley Territorial Company of the Royal Engineers, which he took to France at the end of 1914, and latterly held the rank of major. Mr. Hodgart had been president of the Electrical and Mining Engineers' Association, and was a governor of Paisley Technical College. He had been in ill-health for some time and was 46 years of age.

New Dyestuffs

SOLACET Fast Rubine 3BSa., a further addition to the Solacet range of dyestuffs for the dyeing of acetate rayon (Imperial Chemical Industries) is suitable for dyeing all forms of acetate rayon and possesses very good affinity for the fibre when dyed with the addition of common or Glauber's salt. It is of particular interest for the dyeing of heavy crêpe and materials of similar texture, where good penetration is highly desirable. On account of its very good solubility in water, Solacet Fast Rubine 3BS is particularly suitable for application to jig dyeing. The exhaustion can be controlled by the addition of salt to the dyebath, in a similar manner to that used when direct cotton dyestuffs are applied to cotton. Ground shades dyed on acetate rayon with Solacet Fast Rubine 3BS can be discharged to a good white by the Formosul-calcium (or zinc) sulpho-cyanide processes, or by a process employing Redusol Z.

* * *

SOLACET Fast Orange 2GS. is marketed in powder form and is soluble in water to the extent of 20 per cent. hot and 10 per cent. cold. By virtue of this solubility, together with its freedom from marking off on steaming, this new dyestuff is eminently suitable for direct printing on acetate silk material, giving level and regular results and is of special interest for the printing of pile fabrics, where trouble is liable to occur when dispersed, insoluble acetate silk dyestuffs are used. Solacet Fast Orange 2GS is suitable for the dyeing of all forms of acetate silk material and possesses very good affinity for the fibre when dyed with the addition of common salt or Glauber's salt. It produces golden yellow shades of very good fastness to light, washing, alkalies and hot pressing.

From Week to Week

THE EMPLOYEES of John and James White, Ltd., Shawfield Chemical Works, Rutherglen, have contributed £287 to local charitable institutions.

THE TOWN OF HAIFA was overshadowed on January 9 by dense clouds of smoke as a result of a small overflow from the Iraq pipeline having been set on fire.

A SUBSIDIARY for the production of synthetic benzine and oil has been founded by Friedrich Krupp A.-G., of Essen, under the name of Treibstosswerke G.m.b.H. The ordinary share capital totals Rm.20,000,000 (£1,666,000 at current rates). The company will employ the Fischer-Tropsch processes.

THE NOMINAL CAPITAL of Associated Products, Ltd., manufacturing chemists, etc., Ealing, has been increased by the addition of £1,000 beyond the registered capital of £5,500. The additional capital is divided into 1,000 "C" participating ordinary shares of £1 each.

WE HAVE RECEIVED from C. Isler and Co., Ltd., a large well-printed wall calendar illustrating seven different aspects of the company's well boring activities; also a very acceptable leather wallet with best wishes for 1937 from Clifford Christopherson and Co., Ltd., on behalf of their principals, Three Elephant Borax Corporation, and themselves.

TWO WORKMEN were electrocuted at Ivor by-product works at Dowlais, near Merthyr, on Monday. They were Graham Jayne (23), an electrician, and David W. Jones (18), an apprentice, and they were working on top of the coke ovens. It is believed that they cut a live cable carrying 440 volts. Artificial respiration failed to revive them.

A MEMORIAL to the first Lord Trent was unveiled on January 7, at Nottingham University College, of which he was the donor. It takes the form of the family coat of arms sculptured in marble by Sir William Reid Dick, R.A., and a portrait of Lord Trent painted in oils by Mr. N. Denholm Davis. The unveiling ceremony was performed by Alderman E. Huntsman, a former Lord Mayor of Nottingham, in the presence of members of Lord Trent's family.

FOR THE POST OF CHEMIST to Dundee Corporation Gas Department, two Sheffield men, Mr. J. N. Doughty, Sheffield Gas Co., and Mr. K. M. MacKenzie, United Steel Companies, Ltd., are on the short list. There were 34 applications for the post, the suggested salary for which is £275, rising to £375, the commencing figure to be dependent upon qualifications and experience but not to exceed £325 per annum.

SHAREHOLDERS of the Lancegaye Safety Glass Co., on January 9 approved the board's proposal to increase the capital from £120,000 to £200,000 by the creation of 1,600,000 1s. shares. The chairman stated that it was not proposed to issue the whole of the new shares in one operation. The capital would be offered at a fair price and to shareholders only. It was added that the company's output had increased largely in the past three months and the expansion in the turnover had enabled the management to reduce the cost of production considerably.

CAUSTIC SODA and carbonate of soda, which in the past have been imported solely from Great Britain, are to be imported by Greece from Germany through the Greco-German clearing agreement. Greek imports from Britain of these two substances have hitherto consisted of about 4,000 tons annually, with a value in the neighbourhood of £60,000. The decision to import from Germany will thus be a blow to British firms and shipping companies, already hit by the Greek Government's recently announced decision to take German tinplates instead of British tinplates as hitherto.

A TRIBUTE to the part that chemical research plays in modern life was paid by Mr. A. Dargie, city analyst, Dundee, in an address to Arbroath Rotary Club. Mr. Dargie said that if they made a comparison between civilisation as it was to-day and as it was even a hundred years ago, it would be found there was a complete change in modern life as a result of the development of scientific research and its practical application to modern problems. Chemical research, he added, had contributed to human welfare and improvement in health, which was vital to the well-being of the human race.

THE BOARD OF TRADE has received applications under Section 5(5) of the Finance Act, 1936, for a licence to import free of duty: (1) a Uhertype hand photo-composing machine, a Uhertype photographic making-up machine, and a Uhertype photographic justifying apparatus, and (2) external micrometer gauges for measuring screw threads, interchangeable jaws therefor and master gauge bars for use with such gauges. Any representations that similar articles are made, or are likely to be made within a reasonable time, in the United Kingdom or elsewhere in the dominions should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, London, S.W.1, not later than February 10.

THE TELEPHONE NUMBER of Brown and Forth, Ltd., Nettlefold House, Euston Road, N.W., will be changed to-day (January 16) to Euston 5101-2-3.

BARIMAR, LTD., pioneers of scientific welding, have just opened a new department for handling all kinds of repairs to electric motors, magnetos, dynamos, switchgear, etc.

WORK AT GLENUGIE DISTILLERY, Peterhead, which has been idle for several years, is to be resumed shortly. During the past two weeks about 700 quarters of barley have been transported from Aberdeen to the distillery.

THE NOMINAL CAPITAL of L. P. C. Lead Pigments and Chemicals, Ltd., Avenue House, High Holborn, W.C., has been increased by the addition of £1,000 in £1 ordinary shares beyond the registered capital of £1,000.

A PAPER on "The Inflammability of Coal Dust—with Special Reference to Lancashire Coals," was presented by Mr. N. Simpkin and Mr. G. Wrapson, at a meeting of the Manchester Geological and Mining Society, on Tuesday.

SCOTTISH OILS AND SHELL MEX, LTD., Uphall, Linlithgow, are to erect a bulk oil depot at Shore Street, Kirkwall. Pipe lines are to be installed from the quayside to the site. A hall adjoining is to be demolished to make way for the depot.

FRENCH MOTOR SPIRIT RETAILERS are threatening to close down entirely if the petrol importers carry out their proposal to raise the price of motor fuel by the equivalent of a further 2d. per gal. The taxicab and petroleum transport unions have agreed to support the motor spirit distributors in the proposed strike.

MR. ALFRED P. GODFREY, who has been appointed chairman of a committee of shareholders of Coal and Allied Industries, Ltd., to investigate the company's affairs visited the coal-oil plant at Seaham on January 9. At present only a watchman and a small maintenance staff are working at the plant which was originally intended to employ 1,000 workmen. The adjourned meeting of shareholders will be held on January 28.

THE PROPOSAL to set up three seaweed factories at South Uist, in the Outer Hebrides, has been dropped, and the hopes entertained of a local industry for the manufacture of chemicals and wrapping paper from seaweed has accordingly been disappointed. It had been hoped that the project would start this spring, and it had been stated that suitable sites for the factories had been selected. The factor of the South Uist estate, Mr. John Macdonald, stated: "It is unfortunate that the scheme has fallen through, for it promised lucrative employment. There does not appear to be any prospect this year at least of any development. Thousands of tons of seaweed will now be left rotting on the island shores."

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

French Morocco.—A firm established at Casablanca desires to obtain the representation of United Kingdom suppliers of soya and linseed oils and ground coconut. (Ref. 644.)

Books Received

Report on the Import Duties Act Inquiry (1934). Part 1. London: His Majesty's Stationery Office. Pp. 386. 6s.

British Chemicals and Their Manufacturers (1937). London: The Association of British Chemical Manufacturers. Pp. 466.

Applied Chemistry for Engineers. By A. F. H. Ward. London: Longmans, Green and Co., Ltd. Pp. 127. 5s.

Sugar Reference Book and Directory. 1936. London and New York: Russell Palmer. Pp. 165. 21s.

Soap. By William H. Simmons. 4th Edition. London: Sir Isaac Pitman and Sons, Ltd. Pp. 140. 3s.

Inorganic and Theoretical Chemistry. By F. Sherwood Taylor. Third Edition. Pp. 832. London: William Heinemann, Ltd. 12s. 6d.

Report of an Inquiry into Vocational Education after General Education up to the Age of Sixteen. London: British Association for Commercial and Industrial Education. Pp. 40. 6d.

Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists. 4th Edition, 1935. Washington D.C.: Association of Official Agricultural Chemists. Pp. 710. 5 Dollars 50. (5 or more copies 4 Dollars 40).

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Open to Public Inspection

PROCESS FOR THE PREPARATION of more or less liquid, self-hardening colourless or coloured glazes of organic nature, as well as the manner of their application and employment.—H. Plauson. July 1, 1935. 7785/36.

COMPOSITIONS FROM COAL TAR and higher fatty acid chlorides and process of making the same.—Armour and Co. July 1, 1935. 11309/36.

PROCESS FOR THE PRODUCTION OF AZO DYESTUFFS on the fibre.—Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. June 29, 1935. 13133/36.

PROCESS FOR PURIFYING CHLORINATED HYDROCARBONS.—I. G. Farbenindustrie. July 4, 1935. 13540/36.

COMPOSITION MADE BY COMPRESSING ARTIFICIALLY-PRODUCED RESINS.—Kohle-und Eisenforschung Ges. July 4, 1935. 14650/36.

PROCESS FOR THE REMOVAL OF ASPHALTIC SUBSTANCES and paraffin wax from products containing the same.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 1, 1935. 17850/36.

NON-CELLULOSIC MATERIAL obtained from spent digestion liquor. Mead Corporation. June 29, 1935. 17119/36.

PROCESS FOR THE SOLVENT EXTRACTION OF LIQUID MIXTURES.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 1, 1935. 17726/36.

PROCESS FOR THE MANUFACTURE OF ALCOHOLS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 4, 1935. 17850+36.

MANUFACTURE OF NEW COMPOUNDS of the benzo-fluoranthene series.—I. G. Farbenindustrie. June 29, 1935. 17925/36.

MOULDING OF ORGANIC MATERIALS.—Celluloid Corporation. July 2, 1935. 18203/36.

PIGMENTS.—Imperial Smelting Corporation, Ltd. July 2, 1935. 18259/36.

PROCESS FOR THE MANUFACTURE OF DIALKYLAMINOPHOSPHORUS FLUORIDES.—I. G. Farbenindustrie. July 2, 1935. 18288/36.

PROCESS FOR THE MANUFACTURE OF METHACRYLIC ACID and esters thereof.—Rohm and Haas A.-G. July 2, 1935. 18297/36.

PROCESS FOR PRODUCING GAS suitable for the synthetis of hydrocarbons by the Fischer-Tropsch process or other purposes.—H. Koppers' Industrieele Maatschappij N.V. July 3, 1935. 18496/36.

MANUFACTURE OF WATER-SOLUBLE SALTS of acid esters of the cardiac glucosides.—I. G. Farbenindustrie. July 3, 1935. 18504/36.

Specifications Accepted with Date of Application

MANUFACTURE OF SOLVENTS by fermentation.—J. F. Loughlin. March 23, 1935. 458,922.

MANUFACTURE OF WASHING AGENTS and detergents.—I. G. Farbenindustrie. March 24, 1934. 459,039.

PRODUCTION OF VALUABLE HYDROCARBON PRODUCTS by treatment with hydrogenating gases of distillable carbonaceous materials.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). March 26, 1935. 458,856.

CLARIFICATION OR SEDIMENTATION TREATMENT OF LIQUIDS.—H. J. Talbot, R. G. A. Weiss, and Dorr-Oliver Co., Ltd. March 26, 1935. 459,120.

PURIFICATION OF LIQUIDS.—Dorr Co., Inc. March 29, 1934. 459,126.

RUBBER ANTI-AGERS.—W. Baird, M. Jones, and Imperial Chemical Industries, Ltd. May 24, 1935. 459,045.

MANUFACTURE OF QUINOLINE COMPOUNDS.—W. W. Groves (I. G. Farbenindustrie). May 27, 1935. 459,131.

MANUFACTURE OF HYDROCYANIC ACID.—E. I. du Pont de Nemours and Co., H. A. Bond and C. R. Harris. May 29, 1935. 459,180.

MANUFACTURE OF ANHYDRITE PLASTERS.—F. R. Himsworth, Imperial Chemical Industries, Ltd., and V. Lefebure. June 26, 1935. 459,134.

PRODUCTION OF ALKYL ESTER SALTS.—H. D. Elkington (Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij). June 27, 1935. 459,078.

PRODUCTION OF ALKYL ESTER SALTS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 3, 1934. 459,079.

PROCESS OF TREATING MIXTURES containing free acid and acid alkyl esters.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 3, 1934. 459,080.

PROCESS FOR TREATING MIXTURES containing free sulphuric acid and acid alkyl esters.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 1, 1935. 459,081.

SEPARATION OF OIL PRODUCED BY HYDROGENATION.—Aktiebolaget Separator.—Sept. 25, 1934. 459,142.

MANUFACTURE OF BASIC TRIPHENYLMETHANE DYESTUFFS.—I. G. Farbenindustrie. June 30, 1934. 459,145.

PROCESS FOR THE MANUFACTURE OF COLLOIDAL SILICIC ACID (silica gel) from water glass.—E. Berl. July 5, 1935. 459,058.

MANUFACTURE OF AMINO-ALCOHOLS.—I. G. Farbenindustrie. July 5, 1934. 458,932.

RECOVERY OF AROMATIC CCOMPOUNDS from liquid hydrocarbons. Coutts and Co. and F. Johnson (legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie.) July 8, 1935. 459,189.

WATER CHLORINATION APPARATUS.—F. Howles and B. M. Hills. Oct. 11, 1935. 458,874.

TREATMENT OF FABRICS for the production of non-crease effects. A. Carpmael (I. G. Farbenindustrie). 458,877.

PRECIPITATION OF COPPER from solutions containing copper.—Dr. K. Albert Ges. Chemische Fabriken. Oct. 10, 1935. 458,959.

OIL REGENERATING PLANT.—Vitz L. Hunyadi, and J. Koch. Feb. 7, 1935. 458,964.

PROCESSES FOR THE MANUFACTURE OF TITANIUM TETRACHLORIDE. Soc. des Produits Chemiques de St.-Bueil. April 16, 1935. 458,892.

METHOD FOR FREEING LIQUIDS and fused masses from gases by means of ordinary sound waves.—Dr. F. Kruger. April 18, 1935. 458,893.

CONCENTRATION OF ACTIVE CARBON.—Carbo-Norit Union Verwaltungs Ges. May 10, 1935. 458,894.

PROCESS FOR THE MANUFACTURE OF LAEVO-ASCORBIC ACID.—T. Reichstein. June 18, 1935. 459,207.

MANUFACTURE OF COMPOUNDS OF THE BENZOFLUORANTHENE SERIES. I. G. Farbenindustrie. June 29, 1935. 459,108.

MEANS FOR REMOVING OIL FROM AIR or other gaseous fluids.—Aktiebolaget Separator. Nov. 5, 1935. 458,913.

BREATHING MASK EQUIPMENT.—Dr. O. H. Drager. Aug. 7, 1935. 458,914.

PRODUCTION OF ALKYL ESTER SALTS.—H. D. Elkington (Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij). June 27, 1935. (Divided out of 459,079.) (Sample furnished.) 459,117.

APPARATUS FOR REFINING FIBROUS MATERIAL in a liquid medium. Noble and Wood Machine Co. March 28, 1934. (Divided out of 9669/35.) 458,919.

Applications for Patents

(December 24 to 30 inclusive.)

FILTERING DEVICES.—H. R. Angel and Co., Ltd. 34746.

PREPARATION OF METHYL ALCOHOL from marble.—A. P. I. S. Soc. Anon. Prodotti Italiani Sintetici. (Italy, Jan. 27.) 35268.

WATER-SOFTENERS.—Aquamellis Engineering Co., Ltd. 35238.

RECOVERY OF SULPHUR.—R. F. Bacon. Sept. 28, '35. (United States, Oct. 18, '34.) 35268.

MANUFACTURE OF PIGMENTS.—A. G. Bloxam (Soc. of Chemical Industry in Basle.) 35163.

PIGMENT.—Burgess Titanium Co. 35260, 35261.

MANUFACTURE OF WETTING AGENTS for mercerising lyes.—A. Carpmael (I. G. Farbenindustrie.) 35050.

MANUFACTURE OF ORTHO- AND PARA-AMINO-ARYL SULPHONES.—A. Carpmael (I. G. Farbenindustrie.) 35051.

MANUFACTURE OF CONDENSATION PRODUCTS.—A. Carpmael (I. G. Farbenindustrie.) 35180.

MANUFACTURE OF POLYMERISATION PRODUCTS.—A. Carpmael (I. G. Farbenindustrie.) 35181.

PROCESS FOR IMPROVING THE FASTNESS OF DYEINGS.—A. Carpmael (I. G. Farbenindustrie.) (July 5, '35.) 35304.

POLYMERISATION OF TRICHLORETHYLENE.—Consortium für Elektrochemische Industrie Ges. (Germany, Jan. 6.) 35107.

PROTECTIVE GLASS CONTAINING NEODYM.—Degea, A.-G. (Auerges.). (Germany, May 25.) 35114.

PETROLEUM, ETC. EMULSIONS.—A. H. Dodd, and H. E. G. West. 35209.

MANUFACTURE OF CELLULOSE DERIVATIVE MATERIALS.—H. Dreyfus. 35013, 35014, 35015, 35192.

MANUFACTURE OF SYNTHETIC RESINS, ETC.—E. I. du Pont de Nemours and Co. (United States, Dec. 17, '35.) 34753.

PRODUCTION OF CELLULOSE ETHERS.—E. I. du Pont de Nemours and Co., and J. F. Hastings. 34754.

PRODUCTION OF MIXED ETHER ESTERS OF CELLULOSE.—E. I. du Pont de Nemours and Co. (Legal representative of D. C. Edmonton. 34755.

SYNTHETIC RESINOUS COMPOSITIONS.—E. I. du Pont de Nemours and Co., D. E. Edgar, and W. W. Smith. 35097.

MANUFACTURE OF ACETALDEHYDE, ETC.—E. E. Dutt. 34993.

PREVENTING FORMATION OF GUM-LIKE PRODUCTS IN OILS.—A. C. G. Egerton. 34871.

MANUFACTURE OF ARTIFICIAL RESINS.—H. D. Elkington (Hungarian Rubber Goods Factory, Ltd. (Magyar Ruggyanta-árugyár Részvénytársaság). 34945.

TREATMENT OF BERYLLIUM ORES.—D. Gardner. 34819, 34820.
MANUFACTURE OF TUNGSTEN from its ores, etc.—D. Gardner. 35049.
MANUFACTURE OF AMINO-ACID DERIVATIVES.—J. R. Geigy, A.-G. (Germany, Dec. 23, '35.) 34843.
PRODUCTION OF HYDRO-CARBONS.—Gewerkschaft Auguste. 34740, 34741.
RECOVERING SILVER FROM PHOTOGRAPHIC FIXING BATHS.—W. W. Groves (I. G. Farbenindustrie.) 34698.
MANUFACTURING OF TANNING AGENTS.—W. W. Groves (I. G. Farbenindustrie.) 34848.
MANUFACTURE OF QUANTERNARY SALTS OF MORPHOLINES.—W. W. Groves (I. G. Farbenindustrie.) 34849.
PRODUCTION OF HEAVY WATER.—F. Hansgirg. (Austria, Dec. 23, '35.) 35201.
MANUFACTURE OF TRI- (4-BUTO-DIENYL-1.2) AMINE.—I. G. Farbenindustrie. (Germany, Dec. 20, '35.) 34841.
PRODUCTION OF DYESTUFF PIGMENT PASTES.—I. G. Farbenindustrie. (Germany, Jan. 6.) 35161.
MANUFACTURE OF COMPOSITE MATERIAL.—Imperial Chemical Industries, Ltd., and V. Nefebure. 34909.
FOG-SIGNALS FOR RAILWAYS, ETC.—Imperial Chemical Industries. 34911.
REMOVAL OF THIONATES from solution.—Imperial Chemical Industries, Ltd., and N. Levy. 35094.
PLASTIC COMPOSITIONS.—Imperial Chemical Industries, Ltd. 35095.
PRODUCTION OF MIXED ETHERS OF CELLULOSE.—Imperial Chemical Industries, Ltd., R. R. H. Brown, and A. Walters. 35096.
COLOURING OXIDE FILM on aluminium, etc.—Imperial Chemical Industries, Ltd., F. Hill, and J. A. Radley. 35203.
PRODUCING FAST DYEINGS on mixed fabrics of wool and viscose artificial silk.—G. W. Johnson (I. G. Farbenindustrie.) 35058.
PRODUCTION OF MAGNESIUM.—Magnesium Elektron, Ltd. (I. G. Farbenindustrie.) 35190.
FERMENTATION OF ORGANIC MATTER.—Mitchell Engineering, Ltd., L. Boggiano-Pico, and D. M. Proctor. 35197.
COMPOUNDS DERIVED FROM PICRYL COMPOUNDS.—G. T. Morgan, and J. Stewart. (July 7.) 34714.
MANUFACTURE OF WETTING, ETC. AGENTS.—Proctor and Gamble Co. (United States, Jan. 18.) 34893, 34894.
GARMENTS FOR RESISTING POISONOUS GASES, ETC.—S. F. Roberts. 34680.
MANUFACTURE OF UNSATURATED DERIVATIVES of the cyclopentano polyhydro phenanthrene series.—Schering-Kahlbaum, A.-G. (Germany, Dec. 24, '35.) 35182.
SEPARATION OF MIXTURES OF VOLATILE INORGANIC CHLORIDES and oxychlorides.—W. O. H. Schonstein. (Germany, Dec. 27, '35.) 35143.
MANUFACTURE OF EMULSIONS.—Soc. of Chemical Industry in Basle. 34844, 34845.
EXTRACTION OF ALUMINA FROM CLAYS, ETC.—J. G. Stein and Co., Ltd., and J. F. Ayslop. 35216.
SEPARATION OF ETHYLENE from higher olefines.—W. J. Tennant (Dow Chemical Co.). 35194.
MANUFACTURE OF LACQUER RESINS.—W. J. Tennant (Dow Chemical Co.). 34952.
SEPARATION OF MIXTURES OF VOLATILE INORGANIC CHLORIDES and oxychlorides.—J. Theberath. (Germany, Dec. 27, '35.) 35143.
MANUFACTURE OF SULPHURIC ACID.—A. Zieren. (Germany, Dec. 18, '35.) 34859.
MANUFACTURE OF ORTHO-OXY-AZO-DYESTUFFS.—I. G. Farbenindustrie. (Germany, Jan. 17.) 33929.
MANUFACTURE OF ARTIFICIAL STRUCTURES from viscose.—I. G. Farbenindustrie. (Germany, Dec. 24, '35.) 33930.
MANUFACTURE OF ARTIFICIAL STRUCTURES from viscose.—I. G. Farbenindustrie. (Germany, March 21.) (Cognate with 33930.) 33931.
FLUID-TIGHT PACKING MATERIAL.—I. G. Farbenindustrie. (Germany, Dec. 11, '35.) 34142.
MANUFACTURE OF RUBBER-CONVERSION PRODUCTS.—I. G. Farbenindustrie.) (Germany, Dec. 11, '35.) 33985.
MANUFACTURE OF STABLE COLLOIDAL DISPERSIONS OF METALS.—I. G. Farbenindustrie. (Germany, Dec. 18, '35.) 34277.
MANUFACTURE OF PLASTIC MASSES.—I. G. Farbenindustrie. (Germany, Dec. 20, '35.) 34278.
REMOVING SALTS FROM INDUSTRIAL WATER.—I. G. Farbenindustrie. (Germany, Jan. 25.) 34574.
CONTROL OF VARIABLE PHYSICAL QUANTITIES.—Imperial Chemical Industries, Ltd. 34129.
MANUFACTURE OF FINELY-DIVIDED PHTHALO-CYANINE PIGMENTS.—Imperial Chemical Industries, Ltd. 34130.
CHLORINATED RUBBER PRODUCTS.—Imperial Chemical Industries, J. P. Baxter, L. T. Dod, and S. G. Moore. 34487.
GELATINE BLASTING EXPLOSIVES.—Imperial Chemical Industries, and V. H. Williams. 34488.
MANUFACTURE OF RUBBER-LIKE POLYMERISATION PRODUCTS.—Imperial Chemical Industries, Ltd., B. S. Hapgood, and L. B. Morgan. 34489.
FURNACE FOR LOW-TEMPERATURE CARBONISATION.—G. L. Jarry. (France, Dec. 24, '35.) 34592.
MANUFACTURE OF CONDENSATION PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie.) 34304.
MANUFACTURE OF SYNTHETIC RESINS.—G. W. Johnson (I. G. Farbenindustrie.) 34575.
RECOVERY OF VALUABLE ORGANIC PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie.) (Feb. 8.) 34576.
MANUFACTURE OF MIXED CARBIDES, ETC.—Keramet Ges. (Sept. 10.) (Germany, Nov. 23, '35.) (Cognate with 24733.) 34350.
EVAPORATING-APPARATUS.—E. Kirschbaum. (Germany, March 12.) 34551.
MANUFACTURE OF PLASTIC MATERIALS.—Lancaster Processes, Inc. (United States, Jan. 29.) 34452.
REFINING CAPILLARY-ACTIVE ALYKL ESTERS of polybasic acids, etc., in aqueous solutions.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (Holland, Dec. 24, '35.) 34115.

Chemical and Allied Stocks and Shares

THE stock and share markets were more active towards the end of the week, largely owing to the rather more hopeful developments in the international political situation. There were numerous features of interest among shares of companies connected with the chemical and kindred trades. Borax Consolidated at 36s. have held most of their recent improvement, hopes of a larger dividend having continued. Salt Union were steady. Imperial Chemical lost a few pence to 41s. 6d. on the view current in the market that it is possible the directors may not increase the dividend, bearing in mind the conservative policy invariably followed. Courtaulds were more active at rather higher prices. Results of the latter company fall to be issued next month and the view is gaining ground that there may be no increase in dividend. During the past year the company has apparently expended large sums on new factories and works, and sufficient time has not yet elapsed for profits to benefit fully from this. It is, however, assumed in the market that eventually earnings are likely to expand very considerably owing to increased production. For the previous year the company paid a dividend of 7½ per cent. tax free.

Triplex Safety Glass came in for renewed request on the belief that the expected bonus distribution will probably be announced before long. There was also good demand for British Oxygen which according to current market views are likely to receive a larger dividend for the current year. The shares of Metal Industries, which is a large shareholder in British Oxygen, were higher in sympathy.

International Nickel were bought on the expectation that a further increase in the quarterly dividend is in prospect and on the view that the company will benefit considerably from the rise in the price of copper, of which, as was mentioned last week it is also an important producer.

Imperial Smelting were again better on the hope that the further rise in the price of zinc is a favourable point for the company. British Glues were very steady and continued to be held firmly on the possibility that a good increase in dividend may be possible.

Associated Portland Cement were in request on talk in the market of an increase in dividend from 20 per cent. to 25 per cent., but other cement shares were rather dull. British Electric ordinary shares were favoured on the hope that the forthcoming report may announce payment of the remaining arrears of preference dividend and thus leave the way open for the resumption of ordinary dividends.

There was some profit-taking in cotton textile shares after their recent good improvement, but Bradford Dyers, Calico Printers and the shares of most of the other big finishing combines were again active on the assumption that conditions in the industry are showing gradual improvement.

Pinchin Johnson were higher on the week at 55s. 9d., against 55s., and most other paint shares were steady on the belief that favourable results will again be shown, despite the rise in raw material prices.

Staveley Coal and Iron were again in larger demand at higher prices. There was a moderate amount of profit-taking in Richard Thomas owing to the proposed new issue and the difficulty of estimating the more immediate future prospects in view of the larger capital that will rank. Consett Iron were steady. This company reorganised its capital last year, and, particularly if hopes of a further increase in profits are realised, it is possible a very satisfactory dividend may be forthcoming on the reduced capital.

Oil shares did not keep best prices. "Shell" were relatively steady owing to continued satisfaction with the interim dividend and the share bonus proposals. The final dividend will be payable on the capital as increased by the bonus, but the market is already talking confidently of the total distribution for the year being brought up to 20 per cent., tax free.

Weekly Prices of British Chemical Products

A REDUCTION of an eighth of a penny per lb. in the price of tartaric acid is announced. In the intermediates section of the market there have been slight decreases in the prices of all grades of cresol. There are no price changes to report in the London markets for heavy chemicals, rubber chemicals, wood distillation products, coal tar products, perfumery chemicals and essential oils. An all round increase of £15 per ton in the price of glycerine was announced on Thursday.

MANCHESTER.—The general movement of chemical products on the Manchester market is now pretty well back to normal. Sellers mostly indicate a good aggregate volume of contract bookings during the past month or so and the position in this respect, on the whole, compares favourably with that of a year ago. There has been a fair flow of specifications during the past week, and good deliveries are being taken of the principal alkali and potash materials, as well as of a fairly extensive range of miscellaneous products, with a moderate trade going through for near delivery parcels. The general price position is steady, with marked firmness still in evidence in the case of those sections that are influenced by the rise in non-ferrous metals. There has been little or no improvement in pitch, but in other sections of the by-products market locally a fair business has been reported this week.

GLASGOW.—Business in chemicals has been rather quiet during the week, both for home trade and export, on account of the holidays. Prices, however, continue very firm at about previous figures, with no important changes to report. Apart from cresylic acid, there has been only a moderate demand for coal tar products during the week, and no price changes are reported. Inquiries for all grades of tar acids continue numerous, and present commitments in some instances cover works production for several months ahead. Deliveries have commenced against new year contracts for creosote, all grades of which are now moving well. One or two welcome inquiries for pitch are in the hands of manufacturers but, as there is no evidence of fresh transactions having been concluded, the price remains nominal as last quoted.

General Chemicals

ACETONE.—£62 to £65 per ton; SCOTLAND: £64 to £65 ex wharf, according to quantity.

ACID, ACETIC.—Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £32 5s. to £34 5s.; tech., 40%, £16 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £32 5s.; tech., 80%, £30 5s., d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ACID, BORIC.—Commercial granulated, £27 per ton; crystal, £28; powdered, £29; extra finely powdered, £31; packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. B.P. cryst., £36; B.P. powder, £37. SCOTLAND: Crystals, in 1 cwt. bags, £28; powdered, in 1 cwt. bags, £29.

ACID, CHROMIC.—9¼d. per lb., less 2½%; d/d U.K.

ACID, CITRIC.—1s. per lb. MANCHESTER: 11¼d. SCOTLAND: B.P. crystals, 1s. per lb., less 5%.

ACID, CRESYLIC.—97/99%, 3s. 2d. to 3s. 3d. per gal.; pale, 98%, 3s. 1d. to 3s. 2d.; dark, 2s. 6d. to 2s. 7d.; 99/100%, refined, 3s. 7d. to 3s. 9d. per gal. MANCHESTER: 99/100%, pale, 3s. 8d.

ACID, FORMIC.—85%, in carboys, ton lots, £42 to £47 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50: pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works. SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—£48 15s. to £57 10s. per ton, according to packages and position. SCOTLAND: £2 9s. per cwt. in casks. MANCHESTER: £49 to £54 per ton ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—11¾d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. SCOTLAND: 11¾d. less 5%. MANCHESTER: 11¾d. to 1s. per lb.

ALUM.—SCOTLAND: Ground, £10 2s. 6d. per ton; lump, £9 12s. 6d.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM SULPHATE.—Neutral quality, 20.6% nitrogen, £7 5s. per ton.

ANTIMONY OXIDE.—SCOTLAND: £61 to £65 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £13 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £17 ex store. MANCHESTER: White powdered Cornish £17 10s. ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BARYTES.—£6 to £7 10s. per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.a. London.

BLEACHING POWDER.—Spot, 35/37%. £8 15s. per ton in casks, special terms for contracts. SCOTLAND: £9.

BORAX COMMERCIAL.—Granulated, £14 10s. per ton; crystal £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots. SCOTLAND: Granulated, £14 10s. per ton in 1 cwt. bags, carriage paid.

CADMIUM SULPHIDE.—4s. 3d. to 4s. 5d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums. SCOTLAND: 70/75% solid, £5 10s. per ton net ex store.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¾d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 2¾d. per lb.; liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 19s. net.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £24 10s. per ton. SCOTLAND: 40% £25 to £28 ex store.

GLYCERINE.—Chemically pure, double distilled, 1,260 s.g., in tins, £4 17s. 6d. to £5 17s. 6d. per cwt. according to quantity; in drums, £4 10s. to £5 3s. 6d.

IODINE.—Resublimed B.P., 5s. 1d. per lb.

LAMPBLACK.—£22 to £23 per ton.

LEAD ACETATE.—LONDON: White, £33 15s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £37, brown, £36.

LEAD NITRATE.—£32 10s. to £34 10s. per ton

LEAD, RED.—SCOTLAND: £41 per ton less 2½%, carriage paid, for 2-ton lots.

LEAD, WHITE.—SCOTLAND: £41 per ton, carriage paid. LONDON: £41.

LITHOPONE.—30%, £16 to £16 5s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

PHENOL.—6¾d. to 7½d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39

POTASSIUM BICHROMATE.—SCOTLAND: 5d. per lb., less 5%, carriage paid.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 4¼d. per lb. MANCHESTER: £38 per ton.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P. 4s. 3d. per lb.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. Crystals, 9½d. MANCHESTER: B.P. 10¾d. to 11½d.

POTASSIUM PRUSSATE.—LONDON: Yellow, 7½d. to 8d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £37 10s.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—LONDON: £21 per ton. SCOTLAND: £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: £12 10s. per ton in 1 cwt. kegs, £10 15s. per ton in 2 cwt. bags. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. Anhydrous, 5d. per lb. LONDON: 4d. per lb. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. SCOTLAND: 4d., less 5% carriage paid.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash, £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£29 per ton. SCOTLAND: £1 10s. per cwt.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10; photographic, £14 10s.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM METASILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5¼d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4½d. to 4¾d.

SODIUM SILICATE.—140° Tw. Spot, £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material, £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d. to £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid, 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals, spot, £13 5s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £19 10s. per ton f.o.b. SCOTLAND: £19 15s. per ton less 5% in casks.

SULPHUR.—£9 to £9 5s. per ton. SCOTLAND: £8 to £9.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 5s. 1d. per lb. in 1-cwt. lots.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Neutral quality, basis 20.6 per cent. nitrogen, delivered in 6-ton lots to farmer's nearest station, January, £7 2s. per ton; February, £7 3s. 6d. per ton; March to June, £7 5s. per ton.

CALCIUM CYANAMIDE.—January, £7 1s. 3d. per ton; February, £7 2s. 6d. per ton; March, £7 3s. 9d. per ton; April to June, £7 5s. per ton, carriage paid to any railway station in Great Britain in lots of four tons and over.

NITRO-CHALK.—£7 5s. per ton for delivery to end of June.

NITRATE OF SODA.—£7 12s. 6d. per ton for delivery up to end of June.

CONCENTRATED COMPLETE FERTILISERS.—£10 12s. to £11 1s. per ton for delivery up to end of June, delivered in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton for delivery up to end of June, delivered in 6-ton lots to farmer's nearest station.

Coal Tar Products

ACID, CRESYLIC.—97/99%, 3s. 2d. to 3s. 3d. per gal.; 99/100%, 3s. 6d. to 4s. per gal., according to specification; pale 99%, 3s. 4d. to 3s. 5d.; dark, 2s. 9d. to 2s. 10d. GLASGOW: Pale, 99/100%, 3s. to 3s. 6d. per gal.; pale, 97/99%, 2s. 8d. to 3s. dark, 97/99%, 2s. 5d. to 2s. 8d.; high boiling acids, 1s. 8d. to 2s.; American specification, 2s. 9d. to 3s. 3d.

ACID, CARBOLIC.—Crystals, 6¾d. to 7½d. per lb.; crude, 60's, 2s. 7d. to 2s. 9d. per gal. MANCHESTER: Crystals, 6¾d. to 7d. per lb.; crude, 2s. 8d. per gal. GLASGOW: Crude, 60's, 2s. 6d. to 2s. 9d. per gal.; distilled, 60's, 2s. 9d. to 3s. 3d.

BENZOL.—At works, crude, 8½d. to 9d. per gal.; standard motor 1s. 2d. to 1s. 2½d.; 90%, 1s. 3d. to 1s. 3½d.; pure, 1s. 7d. to 1s. 7½d. LONDON: Motor, 1s. 3½d. GLASGOW: Crude, 9d. to 10d. per gal.; motor, 1s. 2d. to 1s. 3d.

CREOSOTE.—B.S.I. Specification standard, 5½d. to 6d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North: 5d. London. MANCHESTER: 5d. to 5½d. GLASGOW: B.S.I. Specification 5¼d. to 5¾d. per gal.; washed oil, 4¾d. to 5¼d.; lower sp. gr. oils, 5d. to 5½d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d.; 90%, 1s. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0¼d. f.o.r. GLASGOW. Crude, 5½d. to 6d. per gal.; 90% 160, 1s. 3d. to 1s. 4d.; 90% 190, 1s. to 1s. 1d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £12 to £13 per ton; purified crystals, £20 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 to £5 10s. per ton; crystals, £27 to £27 10s. GLASGOW: Fire lighter, crude, £7 to £7 10s. per ton (bags free).

PYRIDINE.—90/140%, 8s. to 9s. 6d. per gal.; 90/180, 2s. 3d. to 2s. 6d. GLASGOW: 90% 140, 7s. to 8s. per gal.; 90% 160, 6s. to 7s.; 90% 180, 2s. 6d.

TOLUOL.—90%, 2s. per gal.; pure, 2s. 5d. GLASGOW: 90%, 120, 1s. 10d. to 1s. 11d. per gal.

PITCH.—Medium, soft, 34s. per ton, in bulk at makers' works. MANCHESTER: 32s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 28s. 6d. to 35s. per ton; in bulk for home trade, 32s. 6d.

XYLOL.—Commercial, 2s. 1d. per gal.; pure, 2s. 3d. GLASGOW: Commercial, 1s. 11d. to 2s. per gal.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £9 per ton; grey, £10 10s. to £11. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.

CHARCOAL.—£5 5s. to £10 per ton, according to grade and locality.

METHYL ACETONE.—40-50%, £45 to £48 per ton.

WOOD CREOSOTE.—Unrefined 6d. to 1s. 6d. per gal., according to boiling range.

WOOD, NAPHTHA, MISCIBLE.—2s. 9d. to 3s. 3d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.

WOOD TAR.—£2 to £3 per ton.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex toluol).—1s. 9¼d. per lb. d/d buyer's works.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 8d. per lb.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100%, d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 5d. per lb., 100% as base, in casks.

o-CRESOL 30/31° C.—6d. per lb. in 1-ton lots.

p-CRESOL 34-5° C.—1s. 6d. per lb. in ton lots.

m-CRESOL 98/100%.—1s. 7d. per lb. in ton lots.

DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 10½d.

DINITROCHLORBENZENE, SOLID.—£72 per ton.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—In bags, £88 15s. per ton; in casks, £89 15s.

α-NAPHTHYLAMINE.—Lumps, 1s. per lb.; ground, 1s. 0½d.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works in casks.

o-NITRANILINE.—3s. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.

Latest Oil Prices

LONDON, Jan. 13.—LINSEED OIL was easy. Spot, £30 per ton (small quantities), Jan., £27 10s.; Feb.-April, £27 12s. 6d.; May-Aug., £27 17s. 6d.; Sept.-Dec., £28, naked. SOYA BEAN OIL was steady. Oriental (bulk), afloat, Rotterdam, £30 per ton. RAPE OIL was quiet. Crude extracted, £35 10s. per ton; technical refined, £36 10s., naked, ex wharf. COTTON OIL was firmer. Egyptian crude, £31 10s. per ton; refined common edible, £35 10s.; deodorised, £37 10s., naked, ex mill (small lots £1 10s. extra). TURPENTINE was lower. American, spot, 44s. per cwt.

HULL.—LINSEED OIL, spot, quoted £28 5s. per ton; Jan. and Feb.-April, £27 12s. 6d.; May-Aug., £27 17s. 6d.; Sept.-Dec., £28. COTTON OIL.—Egyptian crude, spot, £31 10s.; edible, refined, spot, £34; technical, spot, £34; deodorised, £36, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £39, naked. GROUNDNUT OIL.—Extracted, spot, £35 10s.; deodorised, £38 10d. RAPE OIL.—Extracted, spot, £34 10s.; refined, £35 10s. SOYA OIL.—Extracted, spot, £34 10s.; deodorised, £36 10s. per ton. COD OIL.—F.o.r. or f.a.s., 27s. per cwt., in barrels. CASTOR OIL.—Pharmaceutical, 45s. 6d.; first, 40s. 6d.; second, 38s. 6d. TURPENTINE.—American, spot, 45s. 6d. per cwt.

Forthcoming Events

LONDON.

Jan. 19.—Royal Institution of Great Britain. "Electrical Conductivity in Solids: Its Dependence on Crystal Structure and Crystal Faults." N. F. Mott. 5.15 p.m. 21 Albemarle Street, London.

Jan. 19.—British Association of Refrigeration. Symposium on "The Testing and Servicing of Refrigerators." 6.30 p.m. Hall of the Institute of Marine Engineers, 85-88 Minories, London.

Jan. 19.—Society of Chemical Industry. (Plastics Group). "The Problem of Establishing Standard Tests for Moulding Powders and Mouldings." Dr. W. Blakey. 7.30 p.m. Burlington House, Piccadilly, London.

Jan. 20.—Institution of Chemical Engineers. "Superphosphate—Its History and Manufacture." Walter G. T. Packard. 6 p.m. Rooms of the Chemical Society, Burlington House, Piccadilly, London.

Jan. 20.—Institute of Chemistry. (London Section). "Some Recent Advances in the Scientific Examination of Documents." C. Ainsworth Mitchell. London.

Jan. 21.—Chemical Society. "The Mobility of Groups in Certain Nitrodiphenylsulphones." Dr. J. D. Loudon and T. D. Robson. "Influence of Poles and Polar Linkings on Tautomerism in the Simple Three-Carbon System. Part IV. Activation by Sulphonyl Groups." E. Rothstein. "α- and β-hydroxylaudanosines. Part II. The Products of Exhaustive Methylation." Dr. F. E. King and P. L'Ecuyer. 8 p.m. Burlington House, Piccadilly, London.

Jan. 22.—Physical Society. Ordinary Meeting. 5 p.m. Imperial College of Science and Technology, South Kensington, London.

BANGOR.

Jan. 21.—Chemical Society. (North Wales Section) and University College Chemical Society. "The Quantitative Study of some Gas Reactions." Professor M. W. Travers. 5.30 p.m. Chemistry Lecture Theatre, University College, Bangor.

BELFAST.

Jan. 19.—Institute of Chemistry. (Belfast Section). "Ancient Remedies and Cures for Farm Animals." W. Kerr. 7.30 p.m. Physics Lecture Theatre, Royal Belfast Academical Institution, Belfast.

BIRMINGHAM.

Jan. 20.—Institute of Chemistry. (Birmingham Section). "The Work of the Parliamentary Science Committee." Lt.-Col. Sir Arnold Wilson. 7.30 p.m. University Buildings, Edmund Street, Birmingham.

Jan. 23.—Institute of Vitreous Enamellers. (Midland Section). "Colour Measurement." J. M. Preston. 7.30 p.m. Chamber of Commerce, New Street, Birmingham.

BRADFORD.

Jan. 18.—Institute of Chemistry. (Leeds Section). "Properties of Dyestuffs in relation to Fastness to Light and to Potting." L. L. Lloyd. Technical College, Bradford.

BRISTOL.

Jan. 21.—Society of Chemical Industry. (Bristol Section). "Butter Fat." E. B. Anderson. 5.30 p.m. University Chemical Department, Woodland Road, Bristol.

EDINBURGH.

Jan. 21.—Society of Chemical Industry and Institute of Chemistry. (Edinburgh and East of Scotland Sections). "The Renaissance of Analysis." Dr. A. D. Mitchell. 7.30 p.m. North British Station Hotel, Princes Street, Edinburgh.

HULL.

Jan. 19.—Hull Chemical and Engineering Society. "Modern Aerodynamic Apparatus." W. J. Duncan. 7.45 p.m. Room 57, Municipal Technical College, Park Street, Hull.

MANCHESTER.

Jan. 18.—Institution of the Rubber Industry. (Manchester Section). "An Informal Discourse on the Life of Rubber Goods." Herbert Rogers. Constitutional Club, St. Ann's Street, Manchester.

Jan. 19.—Manchester Literary and Philosophical Society. "Short Communications." 7 p.m. 36 George Street, Manchester.

Jan. 20.—Institution of Petroleum Technologists. (Northern Branch). "Kerosene: Its Glorious Past and Future Prospects." J. Kewley. 7 p.m. Constitutional Club, St. Ann's Street, Manchester.

Jan. 20.—Manchester Metallurgical Society and Iron and Steel Institute. Joint Meeting. 7 p.m. Constitutional Club, St. Ann's Street, Manchester.

Jan. 22.—Manchester Literary and Philosophical Society. (Chemical Section). "Recent Progress in Rayon Manufacture." R. Owen-Jones. 7 p.m. 36 George Street, Manchester.

NEWCASTLE-UPON-TYNE.

Jan. 22.—Society of Chemical Industry. (Newcastle Section). "Fishing Industry By-Products." Dr. G. A. Reay. Newcastle-upon-Tyne.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

CANDY FILTER CO., LTD., London, W. (M., 16/1/37.) January 4, debenture to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *£5,650. Oct. 8, 1935.

JAMES EASTWOOD AND SONS (1936), LTD., Leeds, chemical manufacturers. (M., 16/1/37.) January 5, £600 (not ex.) charge, to Lloyds Bank, Ltd.; charged on lands and buildings at Castleton (Lancs.).

STUART, ROY, AND CO., LTD., Stoke-on-Trent, chemical manufacturers. (M., 16/1/37.) December 30, £8,000 debentures, to C. McNeal, Barlaston; general charge. *£2,000 mortgage. April 24, 1935.

Satisfactions

CANDY FILTER CO., LTD., London, W. (M.S., 16/1/37.) Satisfactions January 4, of debentures registered May 5, 1925, to extent of £50, £50, £300 and £150.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

FREEMAN, ERNEST, chemical worker, and FREEMAN, ELIZABETH (married), 15 Hewitt Street, Hightown, Manchester. (C.C., 16/1/37.) £12 5s. 1d. December 10.

Company News

A. Boake Roberts and Co., Ltd.—The directors announce an interim dividend of 2 per cent., tax free, the same as last year, in respect of the year to March 31 next.

John Knight, Ltd.—The directors announce a dividend of 12½ per cent. for the half year to December 31, on the 25 per cent. cumulative preferred ordinary shares, payable on January 30.

Electrolytic Zinc of Australasia, Ltd.—The directors recommend an interim dividend of 6 per cent. on the £1,100,000 ordinary shares. This compares with 4 per cent. for 1935-36, when the total payment was at the rate of 10 per cent., with a final of 6 per cent. The company, of which Sir Colin Fraser is chairman, has an issued capital of £2,600,000, there being, in addition to the ordinary shares, £1,500,000 8 per cent. cumulative participating preference shares. The usual half-yearly dividend on these shares is also announced.

Joseph Nathan and Co., Ltd.—The accounts show a net profit for the year of £85,166, which compares with £74,433 for the previous twelve months. The amount brought in from the preceding year was £67,815, making a total of £152,981. From this has been paid the cumulative dividend on the £200,000 8 per cent. preferred ordinary shares for the years 1933 and 1934, and £20,000 has been transferred to contingencies. Since the close of the accounts the preferred ordinary dividend in respect of 1935 has been paid, and the directors now propose to make the full distribution in respect of 1936, thereby bringing dividends on these shares up to date. This leaves a balance, after allowing for depreciation and estimated taxes, of £33,981, compared with £35,815 last year. The transfer of certain of the company's trading activities to subsidiary companies is reflected in the accounts, and since the close of the financial year the remaining trading departments have been incorporated as private companies, all the capital being held by the parent company or its nominees.